

Through Norway with Ladies

Preface to the electronic edition

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PREFACE.

The title of this book sufficiently indicates its fraternity with 'Through Norway with a Knapsack,' which it resembles, inasmuch as it is a gossiping diary narrative of the incidents of a journey in Norway and the reflections they suggested.

It differs from its predecessor, however, in representing the opposite phase of Norwegian travelling experience. In the first book I have shown what may be done and seen by a solitary pedestrian who chooses to "rough it," while here are demonstrated the possibilities of travelling in Norway with a degree of comfort such as ladies and the majority of Englishmen demand.

A glance at the map will show that our journey was a bold and extensive one, considering that it was merely a school-girls' holiday trip.

We scaled the northernmost limits of ArcticEurope, and sailed through the Arctic Ocean to the Russian frontier; this portion of our journey within the Arctic circle extending over nearly two thousand miles. We fraternized with the Laplanders, "assisted" at the milking of the reindeer, and at the blubber peeling and cutting up of huge Arctic whales; and altogether enjoyed experiences of Arctic life and scenery that but lately were open only to the hardiest and most adventurous of travellers.

In the southern overland portion of our trip we hired about two hundred and fifty strange horses and an equal number of strange vehicles, with still stranger rigging to represent harness; the ladies themselves drove six-sevenths of these over the mountain roads, and up and down some hills that a professional English coachman would refuse to attempt. Some of these ladies never held reins before, and yet we escaped without breakdown or collision, or even the most trivial accident.

The narrative will show how all this may be repeated by any other ladies endowed with sound health and the usual pluck of Englishwomen. I have not, however, confined myself to the bare narrative of these travelling incidents, but have occasionally run off the track to follow up some collateral subjects that have started on the way. This is especially the case with the phenomena and philosophy of the ancient glaciation of Scandinavia. I have even ventured to expound an original theory of the mode of formation of that remarkable legacy of the "great ice age," the stony clay or "till;" and, besides this, have described some hitherto unnoticed glacial phenomena on the coast of Norway, which controvert the statements made by some of our most eminent geologists concerning the thickness and extension of the ancient "mer de glace" of Northern Europe.

In order to render these and other glacial interludes intelligible and interesting to all readers, the second chapter is devoted to a popular elementary essay on the phenomena and philosophy of glaciers, and all the subsequent disquisitions on this subject are written in a popular, explanatory, and, I hope, a readable style.

For the illustrations, I am partly indebted to Norwegian, German, and French artists, and largely so to Mr. Pritchett, whose artistic skill and knowledge of the country have enabled him to convert my rough note-book diagrams into effective and truthful pictures.

The Appendices include a statement of the expenses of travelling in Norway, the particulars of the sailings of Norwegian steam-packets for the present year, and an account of the projected and adopted national railway system of Norway. I have abridged this from the Report of the Royal Commission of 1875. The existing and projected lines are laid down on the map of Norway, showing our route. This is, I believe, the only English map on which they have yet appeared.

Belmont, Twickenham,

April, 1877. THROUGH NORWAY WITH LADIES.

CHAPTER I.

Contrasts — Development of Norwegian tourist traffic — Passengers on the ‘Argo,’ and their tub of introduction — Whales — The Norwegian coast — Stavanger — Glacier vestiges in the High Street — Bergen — Indoor ivy — A Church of England Service conducted in the spirit of Primitive Christianity — Northward Ho! — Aalesund — Christiansund — Delay and disappointment — Trondhjem — Northern luxury — The Cathedral — The Falls of the Nid — A terraced valley — Prosperous farmers — The “Störhaus” — Glacial origin of the terraces.

July 11th. — Reach Stavanger, after a singularly calm and waveless passage of just forty hours from Hull, by the Wilson liner ‘Argo.’

The contrast between the smooth water of this, and the rough sea of my first passage, described in ‘Through Norway with a Knapsack,’ was not greater than the difference between my own position, intent, and prospects on the two occasions.

In the first case I was a careless, irresponsible bachelor, travelling alone, with only a pocketful of luggage in a little wicker knapsack; now I am a grizzly-bearded *paterfamilias* with heavy responsibilities left behind at home, and further and tremendous responsibilities here on the Scandinavian coast; having actually and deliberately dared to act as guide, companion, and protector to six otherwise unprotected ladies throughout a rather extensive Norwegian tour. I need scarcely add that the luggage under my supervision this time exceeds a pocketful, though, to do the ladies justice, I must say that they have been very moderate— i. e. for ladies.

In 1856 I courted hardship, went out of my way in search of it, selected the North because hardship was most attainable there; now my object is exactly reversed, it is not hardship, but (I should like to say “softship,” but dare not) the utmost attainable Scandinavian representatives of comfort and luxury are the leading objects of my anxiety. In my first journey I was a fore-cabin passenger; now, of course, I am a first-class passenger.

There were other contrasts besides these. The “wave-line” abomination that swung me across in 1856 was a vile intoxicated tub, so celebrated for its hateful rolling that the owners had difficulty in finding a crew to sail in it, and changed its name accordingly to the ‘Oscar’ on its return from the Crimea. The steward was seasick, broke his nose and several plates in the course of one of his frequent pitchings down the companion ladder, and was finally put to bed by myself and my *one* fellow passenger, a Norwegian stonemason. The saloon passengers were six in number, and all invisible.

The ‘Argo,’ though an inferior specimen of the steadily improving “Wilson liners,” is vastly superior to the wretched ‘Oscar.’ She was crowded with passengers fore and aft, especially in the ladies’ cabin, and everything on board indicated a wonderful development of tourist traffic since 1856. In consideration of the share which ‘Through Norway with a Knapsack’ has had in effecting this development, Messrs. Wilson and Sons very liberally presented me with a free passage to Bergen.

Most of the passengers were good specimens of modern English manhood; members of the Alpine Club, col-climbing clergymen, yachtsmen, and sportsmen of the vigorous type who hunt their game as well as kill it. The majority were young men born and reared in what a fine writer would call "the lap of luxury," and sufficiently sated thereby to rejoice in turning their backs upon Mayfair, in order to refresh their souls and bodies by wholesome struggle with the invigorating hardships of Scandinavian sport and travel. Neither broadcloth nor fine linen is visible among them; not more than one in six has a shirt collar; cravats of all kind are utterly abjured; coloured flannel shirts and coarse frieze, or other loose useful woollen garments, are universal.

The small amount of English reserve which at first prevailed on the night of embarking was effectually dispersed at an early hour on the following morning by a bare-necked clergyman in knickerbockers announcing to all concerned that he had discovered a "tub" near the engine room, and that the fire-hose was available. The rejoicing was universal, and we all became fully introduced to each other in the course of arranging our turns to the bath, or the more popular hose, from which a grinning Norwegian sailor projected upon us a luxurious salt-water engine-pumped douche of about 2½ inches in diameter.

The luggage strewed about the men's cabin consisted chiefly of knapsacks, gun-cases, fishing rods, ice-axes, and short pipes. No approximation to a dressing case was visible. One man carried a razor.

During the latter part of the voyage we saw six whales, most of them of large size. The coast has the bare rocky beachless and sandless character that usually prevails in Norway. We stopped at Stavanger, and most of the passengers landed and strolled through the town. The inhabitants, although now pretty well accustomed to such visits from English tourists, were obviously surprised at the unusual invasion of so many ladies; and a procession of many small Norwegians, and a few full grown, followed us throughout our wanderings.

Stavanger is a characteristic wooden town, and being the first that my pupils had seen in Norway, they were, of course, much interested with the log walls and verdant roofs of the carefully detached houses. The cathedral is worth a visit. Its massive Norman pillars and arches and harmoniously massive carved pulpit are interesting.

The geology of the district is strikingly displayed, even in the midst of the town, by the humpy glaciated mounds of mica-schist that crop out on the public highways. These rocks are scarcely distinguishable from those which are presented to the tourist at his first sight of the Norwegian coast on the route to Christiania. After we left Stavanger in the evening and sailed on towards Bergen, following the coast, and passing through narrow channels and between islands, we passed a multitude of bare micaceous rocks cropping out of the sea, just as the Stavanger rockmounds crop up through the High Street. All are similarly rounded and polished by ages upon ages of ancient ice-rubbing.

July 12th.—We reach Bergen at 7 a.m., having left Hull at midnight of Thursday, and halted about five hours at Stavanger. We selected this route rather than the more usual one *viâ* Christiania, in order to catch the North-going packet at Trondhjem in time for the midnight sun.

My experience of both routes decides me to recommend that by Christiania to all tourists and sportsmen who are making their *first* visit to Norway. Every kind of local information and assistance are obtainable at Christiania, where there are good hotels, shops of all kinds, *and more especially Mr. Bennett*, to whom every English tourist applies, and whose untiring courtesy, conscientious advice, and stores of practical information freely supplied to all, are invaluable. Bergen being devoted to the exportation of salt fish and cod-liver oil, is too busy to attend to tourists.

Our first impressions of Bergen were very unpleasant. The only available luggage porters were some low sottish idlers. Two of these, after wheeling our luggage a very short distance to the hotel, made an exorbitant demand for their half-hour's work, and were very troublesome on my refusal to pay them more than one dollar. This was quite a new experience to me in Norway. The resemblance of these fellows to the boatmen and porters who infest the docks, &c., of the Thames, and prey upon helpless foreigners landing there, was more obvious than agreeable. The hotel keepers of Bergen have not yet grasped the idea of providing themselves with a

wheelbarrow of their own, and instructing one of their servants to take charge of passengers' luggage. In Christiania civilization has now advanced to this point.

A sunny welcome adds much to the pleasure of landing in a strange country. This may be received at Christiania, and traditional accounts of sunny days in Bergen are extant, but the tourist must not expect to see them. Bergen enjoys the distinction of being the rainiest city in Europe. It is the fatherland of drizzle; it receives above 82 inches of water per annum, nearly five times as much as falls in corresponding latitudes in Sweden, above three and a half times the quantity that is poured upon equal areas of London, Edinburgh, Dublin, or even Glasgow, and more than four times as much as on St. Petersburg. The "gentle rain" was dropping lightly and steadily when we landed, and continued with a familiarmatter-of-course regularity during the thirty hours of our stay there. Having had no subsequent communication with Bergen, I am unable to say whether it has yet ceased.

The streets of Bergen are wide, and being continuously washed, are, of course, very clean. The houses are capacious and wooden, like those of Christiania. The position of the town is remarkably picturesque, the site of the market place especially so. It is a broad sloping street, or piazza, with a statue of "*Christie*" in the middle, and at each end are beautiful views of enclosed patches of sea, backed by mountain slopes clothed with emerald vegetation. Every bit of spare ground at the ends and corners and other parts of the streets are planted with trees, all remarkable for the bright richness of their verdure, due, no doubt, to humidity of climate, and serving as a sort of substitute for blue sky.

Sontum's hotel was full, and we were lodged in a private house adjoining, taking our meals only at the hotel. The lodging house was scrupulously clean, with abundance of white lace curtains and growing flowers. In our sitting room there were pots of ivy which was trained around the windows, and along the inside walls of the room. I saw this in many other rooms afterwards in other BERGEN parts of Norway, but do not remember to have seen it in 1856.

After breakfast a well-known member of the Alpine Club, and son of a distinguished literary canon, invited us to a service to be conducted by himself and a brother clergyman in an adjoining hotel. The second clergyman was the same that announced the "tub." The invitation was gratefully accepted, although most of the ladies are Dissenters, and myself a heretic.

Both of the clergymen are Alp climbers, and both officiated in their climbing clothes, their frieze jackets, hob-nailed boots, coloured flannel shirts, &c. The church was an unconsecrated capacious wooden bedroom, the pulpits were heavy deal chairs, and the lectern a deal dressing table. We seven formed a majority of the congregation. The service was one of the most impressive I have ever attended, and the main source of this impressiveness was, doubtless, the absence of all histrionic adjuncts, permitting the moral earnestness of the clergymen to exert its full, direct, and unadulterated influence.

To one who, like myself, has done a little behind the footlights, the robing in the vestry is irresistibly suggestive of the "making up" in the greenroom; and altar furnishings and decorations spontaneously and irreverently associate themselves with stage "properties." This is, of course, very naughty, but I cannot help it; the richer the vestments and the more ornate the service (good music excepted), the more and more stagey and got-up the whole performance appears.

July 12th.—After settling the important business of cashing circular notes and obtaining a supply of *small* change—a necessary provision for all travellers in Norway—we embark on the 'Arcturus,' and start at about 1 p.m. for Trondhjem. The Bergen weather continued until about 9 p.m., when the sun broke through the clouds and gave us our first display of the glories of Northern sunset and twilight. The coast hereabouts is picturesque, wild, and rocky, with a multitude of islands, between which the vessel threads her way, guided by a local pilot. One of the largest of these, the ponderous mass of a dark purple insular mountain, blotted out the sun just as he was setting about an hour before midnight, and the effect of the glowing rays pouring away on all sides of the huge shadow in which we were enveloped, and copper bronzing the smooth reflecting surfaces of the southward

rocky islands and promontories, was very splendid.

July 14th.—Several of the ‘Argo’ passengers are on board. We land some of them at Aalesund, a snug little town nestled amidst bare rocks and rocky islands, like those among which we sail all day. By continually surrounding us they form a multitude of channels and sea lakes. The season is late, the north wind is blowing still, though the usual date of his departure is past, and consequently the snow lies thickly in the hollows of the larger masses of rock, some of which are very fine.

We reach Christiansund at 9 p.m. It is a beautiful little wooden Scandinavian Venice, with its grand piazza in the centre, and main streets branching therefrom. The piazza is a circular lake of sea, and the main streets are broad lanes of salt water, separating from each other the different quarters of the town, which is built on three islands. We leave it at about midnight, passing through a rock-walled, sea-paved gully, about as wide as a main-line railway cutting.

July 15th. — The ‘Arcturus’ is disgracefully behind her time, and we have now but little hope of catching the North Cape packet. This experience of the uncertainty of these coasting steamers adds another reason for choosing the route *viâ* Christiania and over the Dovrefjeld. The time required for this overland journey may be estimated, and the estimate fulfilled; as it is possible to make up accidental loss of time when posting, by travelling at night; but here, on board an unpunctual steam-packet, the unfortunate tourist is utterly helpless. By the admirable telegraphic service of the Norwegian coast, messages may be sent from barren, desolate, and apparently uninhabited lumps of rock to any part of the civilized world; and we avail ourselves of this to advise the steam-packet office at Trondhjem that eight passengers desire to meet the Arctic boat at the mouth of the Trondhjem fjord. In spite of this we miss it by about three hours; the ‘Arcturus’ being twelve hours late, reaching Trondhjem at about 10 a.m. to-day instead of 10 p.m. last night. The North Cape packet being advertised to start at midnight, we had eight or nine hours of margin, which I supposed to be sufficient, as it is always possible to meet the Trondhjem boat and go on board from a station in the mouth of the fjord, above three hours distant from the city. I mention these particulars that other tourists may profit by my experience. This disappointment was exceedingly vexatious, as we had hurried away from London and taken this route to Trondhjem in order to catch this week’s North Cape packet, and thus get into the Arctic regions in time for the midnight sun. There are several hotels in Trondhjem, and they are by no means exclusively devoted to tourists, but are largely occupied by commercial travellers who, with the increasing wealth of Norway, have become rather numerous here. The Hôtel d’Angleterre being the largest, and that where tourists most do congregate, we proceeded thither and found comfortable quarters. The ladies had a very capacious, I might almost say a splendid, apartment devoted to their own especial use. We dined at a table-d’hôte, had good soup, excellent fish, joints, entrées, pastry, and dessert; were altogether treated in such hotel-like fashion, that, surrounded not only by my pupils, but also amidst several other English tourists who of course had read ‘Through Norway with a Knapsack,’ I felt somewhat uneasy, lest all of them should denounce me as a humbug, and my descriptions of Norwegian hardship as pure romance. Besides all these, we found that good warm baths are obtainable at the Harmonium Club, and that in most other respects we were in a city of considerable luxury, notwithstanding its high latitude.

Of course we visited the cathedral, which I need not again describe. We were unable to form a just idea of its interior, as it was in a state of chaos, undergoing very extensive alterations and restorations. I say “we,” not in an editorial, but in a literal and largely collective sense, for although we were but seven on starting from Hull, it somehow happened that one or two of the ‘Argo’s’ passengers discovered at Bergen that it would be more convenient to steam on to Trondhjem by the ‘Arcturus,’ and let the yacht follow and pick them up there, than to go on board at once at Bergen; and one or two others discovered that their salmon rivers could be more easily reached from Trondhjem than from Bergen. These happened to be *young* gentlemen, but their attention to the young ladies was so courteous and respectful, that even the stern *pro-tempore* papa and vigilant governess could only be amused, and secretly approve the good taste which prompted their admiration.

We also walked up the rich valley of the Nid to the falls of that river, the Lerfoss or Lerfossen. (The termination

en is the definite article placed at the end of the word, instead of before it as in English.) The lower fall, the Lille Lerfoss, about 3½ miles from the city, is about 80 feet high and 120 feet wide, and the upper fall, the Store Lerfoss, a mile beyond, is about 100 feet high and 450 feet wide. We saw them both to full advantage, the river being swollen by recent rains and snow thaw. Although these are only classed with the ordinary waterfalls of Norway, we all agreed that they are finer than any in Switzerland. They are best comparable with the falls of the Rhine at Schaffhausen, but the Nid is 450 feet wide at the Store Lerfoss, against 300 feet, the width of the Rhine. The height of the Rhine fall is 60 feet on the one side and 45 feet on the other, against 100 feet of the Lerfoss. The quantity of water is, as far as I may judge from memory, about the same on both rivers, but more outspread in the upper Lerfoss, and more heaped and concentrated than that of the Rhine in the lower Lerfoss. Both falls are more perpendicular than that at Schaffhausen. The rebound of the lower fall is especially fine; not merely spray, but tons of pounded shattered water shoot up nearly as high as they have fallen, and a cloud of spray rises far above this. There is a good point of view from a square stone platform at the first fall, just where the river bends in glassy, unbroken wave before “the hell of waters” begins. At the upper fall, also, is a natural platform about two-thirds from the top, from which the view of the fall is especially magnificent.

This first and moderate experience of Norwegian waterfalls prepared those among our party who had travelled in Switzerland, to recant their scepticism concerning what I had stated respecting the great superiority of Scandinavian to Alpine waterfalls.

This walk also afforded an introduction to another of the characteristic physical features of Norway—the terraced valleys. The valley of the Nid, like all the greater valleys of this region, is a gigantic staircase of two or three, or more, up to a dozen steps, the steps varying from eight or ten up to about a hundred feet high, and with all breadths, from half a yard to a mile or two. The top of each of these steps, that is, of the terraces, in this part of this valley are beautifully flat, ready-made croquet lawns if merely rolled and mowed. They are very fertile and well cultivated.

The largest and richest farms I have seen in Norway are hereabouts. Some of the farmers that we saw in the course of our walk were more like English country squires than Norwegian bonders. One, wearing white corduroys, blue coat with gilt buttons, topboots of the old school, and immaculate white Woodstock gloves, and mounted on a splendid hack that could carry a sixteen-stone rider over an old-fashioned five-barred gate, was especially noticeable and noticed. We had some milk at a farmhouse, which, in auctioneering English, and without auctioneer’s exaggeration, might be fairly called “a very desirable family mansion.”

There were other similar farmhouses in the neighbourhood, and many fine specimens of the characteristic Norwegian *størhus*, from which I suspect we derive our English word storehouse, though its meaning in Norsk is simply “large house,” from “*stor*,” large, and “*haus*,” pronounced exactly the same as our word “house.” They bear this name in Norway on account of their great size. They are commonly the largest buildings on a farm. They are storehouses also, in our sense of the word, being the buildings in which the hay is stored for winter use instead of being exposed to the weather, as in our haystacks. These storehouses are, as seen from outside, apparently of two stories, but really only of one within. There are two doors, one on the ground level, and another much higher, the latter approached by a wooden incline wide enough for the ascent of a hay wagon. The hay is pitched in by this upper opening and withdrawn by the lower. This housing of hay is universal throughout Norway, but there are few districts where the storehouses are of such magnitude as hereabouts, and in the Gulbrandsdal. When I first visited Norway the terraces were generally regarded as alluvial deposits, and I described them accordingly. Now they have an additional interest, further study of glacial phenomena having connected them with glacial action. I therefore looked for the evidences of this, and found them in abundance wherever a rivulet had cut a deep channel through the deposit. There I found a stiff blue clay, in some places 100 feet thick, and imbedded in it were a few boulders that tell in outline the story of its formation, but leaving the details to be filled up. The blue clay, with its included boulders smoothed and scratched with parallel lines and grooves upon their surfaces, fairly represent that interesting and somewhat puzzling formation known in

Scotland as “*till*.” But what is “*till*”? and what is the story told by these communicative boulders? some of my readers may ask. The next chapter is added in order to answer these and some other questions suggested by the most characteristic physical features of Norway.

CHAPTER II.

A SHORT ESSAY ON GLACIERS.

As the reader may have already noticed, I had no sooner landed on Norwegian ground than I began to talk about glaciation, even in the High Street of Stavanger; that I took up the subject again as we coasted towards Bergen, and have broken out afresh in the valley of the Nid. Those who have never studied this subject are possibly becoming bored already, and will pronounce me a glacial maniac before they finish this book if they continue unacquainted with the rudiments of the subject. The following popular sketch is intended to avert this calamity, by rendering all I shall have to say on the subject hereafter intelligible, and, I hope, interesting. Those who are already learned in glaciers may skip this little interlude.

It must be remembered, in the first place, that, as we ascend a mountain, the temperature decreases, and thus we may reach a height where the snow that falls during the winter does not thaw in summer. This is called the snow-line. The height of this line varies with the latitude, aspect, proximity to the sea, length of summer, &c.

In order to understand what must occur at and above this line, let us first of all imagine a high mountain range, forming a single, long, smooth, sloping, rounded back; or an angular ridge like a house-roof, and perfectly unbroken at its sides. The snow, in this case, would begin thawing in the spring at the lower part, and a nearly even line would be formed by its boundary. This line would rise during the advance of summer until it reached an elevation at which the whole heat of the year would be just capable of melting the whole snowfall of the year: and thus would form the “snow-line.” Below this the summer heat would overpower the snow and bring it down as water, while above it the snow would prevail, the whole year’s heat being less than sufficient to melt the whole year’s snowfall. Thus there must be an annual increase of snow in this upper region. What must become of this continuous accumulation? It is obvious that it must increase in depth; and the greater the elevation, within certain limits, the greater the rate of this increase: thus it must top up, till it exceeds the angle of repose and then slip down in avalanches. Two kinds of avalanches will be thus produced. In the winter, when much snow has recently fallen,—and this snow, from the absence of the sun to overpower the continuous cold of both night and day, remains a dry, incoherent powder,—it must accumulate till it slips down in great sweeping strata of dust, and thus form the “dust avalanche” (the “*staublaunen*”): too well known as a winter visitor to some of the Swiss valleys. In the summer time, even above the snow-line, the sun’s rays are powerful enough to thaw the *surface* of the snow, and the water sinking into the snow would partly freeze again below the surface, while that upon the surface would freeze during the night: thus a frozen, coherent mass of snow must form, and when this gave way it would slide down in lumps, forming the well-known summer avalanche of the Alps and other mountain regions.

Now let us suppose our roof-shaped mountain to be furrowed down its sides by the wear of these descending avalanches, or of waters, so as to present the form of a ridge-and-furrow slope, something like the roof of the transept of the Crystal Palace. The snow would, of course, accumulate in the furrows, and soon become so deep that the melting power of the summer heat would not clear it away to the same height as before; while on the ridges the snow would lie so thinly, that it would be melted speedily, and the visible snow-line would there be much above the original height. Hence the apparent snow-line would lose its regularity, and be a waving or zigzag line. If these furrows were irregular, such as must be formed by the running waters and sliding avalanches

wearing away the rock in some parts more than in others, this waving or zigzag line would have a corresponding irregularity, such as we actually see on ordinary mountain chains. The path of the avalanches would now be limited to these furrows, and as the rock forming the sides of the furrows or troughs became weather-worn, disintegrated by frost, or otherwise rendered friable, its loosened fragments would be torn and dragged down, with the sliding avalanches, and deposited in heaps at the bottom.

Now let our supposititious great mountain ridge assume a more complex form: let there be huge pyramids and peaks of rock sprouting irregularly from its sloping side, and toothing the edge of its summit ridge. There would be a labyrinth of hollows between these peaks, forming valleys and basins in the upper ground above the snow-line. In these the snow would rest and accumulate just as water accumulates and forms lakes and tarns wherever a similar configuration occurs below the snow-line; but the snow would not merely find its level in these basin hollows, it would heap beyond and around them, and fill up the communicating avenues between; thus forming a great table-land of snow out of or around which the rock peaks would arise.

This is what we find in the Alps, where it is called the *nevé*. Such is Mont Blanc, which appears like a single rounded camel-back mountain; but I have no doubt that its actual structure is a bunch of ragged granite peaks, like the 'Aiguilles' near to it: and that the spaces between these acute pyramids, from their bases up to the verge of their summits, and even above the summits of some of the less elevated, are filled with consolidated snow, reaching in some parts to thousands of feet in depth. The Mont Blanc de Tacul, the Rochers Rouges, the Grands and Petits Mulets, &c., which stand like rocky islands amidst the vast plains and slopes of snow, are but the summits of these tall, acute pyramids, thus buried neck deep. This *nevé* or table-land of consolidated snow is more fully displayed in Norway than in the Alps. It is known as "*fond*" or "*sneefond*," as the *Folgefond*, the Justedal *sneefond*, the *Fondalen*, &c., which are great rolling fjelds or table-lands deeply buried in welded or refrozen snow, with mountain peaks projecting above and around.

Wherever such a table-land or labyrinth of rock basins and troughs exists above the snow-line it is evident that its growing accumulation of snow will ultimately overtop the barriers, and must overflow by some means. But how will this overflow be effected? Will it all slide down as avalanches, or may not the barriers formed by the rising peaks above and below the snow-line interfere with this simple mode of outlet?

The Norwegian table-land of snow, or "*snee-fond*," notched at its edge with rising peaks and outbranching valleys, presents these phenomena in a simple form that may be easily understood. It must be remembered that such fjelds are not quite level; they are more or less backed or elevated towards their centre, so that there is a varying slope towards the great notches between their boundary mountain peaks. These notches must necessarily form outlets for the overflowing accumulation of snow. But how will this overflow be effected in cases where the slope of the fond is not steep enough for the fall of avalanches, and where the snow that covers it is refrozen or welded together, and has become a great bed of ice? How can such a solid mass *overflow*? These are fair questions that must suggest themselves to a thoughtful reader.

The solution of this apparent difficulty is afforded by the fact that there is no such thing within the range of human knowledge as absolute solid, or perfectly rigid matter. The "solid foundations of the earth," as we call them—the rocks of the earth's crust—have a certain amount of viscosity or limited fluidity, well shown by earthquakes, when the earth heaves in billows like the sea, and these great waves radiate in all directions from the centre of disturbance. The bending down of the rocks above a coal mine illustrates the same property. Ice has a high degree of such viscosity. Fragments of ice, whether large or small, may be moulded to any desired shape by pressure, and the cast thus obtained is clear transparent ice, the united particles cohering into a single piece. Substances generally that are semi-fluid may be similarly welded together; thus malleable iron, which passes through an intermediate condition before melting, is welded or joined by simply placing two clean heated surfaces together and hammering. Platinum and glass, which soften in like manner before fusion, are weldable; so are many other substances, such as lead, wax, &c.

Ice is one of these. Although its melting point is so very much lower than those of iron or platinum, it behaves like them as it approaches this point, and if two pieces of ice at this temperature are simply pressed together they become one piece.

Every schoolboy who has played at snowballs is familiar with this. He knows that snow, especially when thawing, i. e. when passing from the solid to the liquid state, is weldable, and he squeezes the granules of ice into a coherent ball, just as the puddler squeezes granules of semifluid iron into a "puddle-ball" with his rabble. By further pressure of the steam-hammer, or "squeezer," the puddler welds the spongy ball into dense iron, and the snowball may be similarly welded into compact ice if sufficient pressure is applied. Cold iron is unweldable, so is cold ice, i. e. ice at a temperature much below its freezing point. Snowballing is impracticable during the winter in Arctic regions. The snow is as incoherent as sand. But even in the coldest regions above the snow-line, the temperature of a deep layer of snow rises to about the freezing point as we descend below the surface; and thus every deep layer of snow becomes imperfectly welded into semi-compact and very plastic ice, especially at its lower part. The accumulations above the snow-line forming the *nevé* of the Alps, or the "fond" of the Scandinavian mountains, are thus capable of actually flowing like a river down any available outlet, and draining off the upper accumulations. This down-flow is aided by some other actions that I will presently describe.

Where, then, will these outlets occur? In the case of the Norwegian "fond," where the upper accumulation rests upon a vast table-land or fjeld, the outlets must evidently be the notches between the outlying or boundary peaks of the fjeld and the radial sloping trough-shaped valleys with which these notches communicate. In a long chain of mountains, with a long sloping *nevé*, the outlets will be the lateral valleys that furrow the sides of the chain.

If the sides of these outlet valleys are very steep, the overflowing ice bends over their sides, becomes detached from the parent accumulation, and slides down as an avalanche. If this steep valley spreads out below sufficiently to expose so large a surface of the avalanche material that it shall all be thawed during the summer, a permanent avalanche outlet will be established, such as that on the Jungfrau, which the tourist contemplates at a respectful distance from the Great Scheideck, where avalanche performances are constantly going on during the summer, and may be seen and heard at intervals of only a few minutes.

If, on the other hand, the outlet valley narrows towards its mouth to such an extent that the avalanche material cannot melt during the summer, it must of course become blocked up, and finally filled with the overflowing ice. The same may occur, more or less completely, if its slope is too gradual for actual avalanche fall. The overflowing ice will then be pushed forward in mass by the pressure of that behind it, aided or eased by its own gravitation.

In chapter ix. of 'Through Norway with a Knapsack,' I have described some interesting illustrations of the distinction between avalanche and glacier valleys that occur in the Romsdal, where both may be seen in miniature, and side by side.

A valley thus filled with such overflowing ice, or welded snow, constitutes a true glacier, and the material of which it is mainly formed is very porous, I may almost say spongy; and through these pores there is (during the summer time, certainly) a continuous infiltration of water, derived from the melting of the surface of the glacier. The magnitude of these pores and the extent of this infiltration are, I think, but imperfectly appreciated by some eminent modern glacialists. Thus Mr. Geikie ('The Great Ice Age,' 2nd edit. p. 35), speaking of the motion of glaciers, describes the molecular constitution of ordinary compact [**continued on next pg.**] On its way down some of this water is refrozen: and what happens then? Water in the act of freezing expands to an extent of about one-fifteenth of its bulk with an almost irresistible force. This expansion occurring within the substance of the glacier presses it outwards in all directions; but the sides being walled in by the valley, and the upward expansion resisted by the weight of the ice above, the plastic mass yields in the direction of least resistance, and is thus thrust downwards with a force that operates most powerfully at the

[**contin. from prev. pg**] ice, and attributes only this very microscopic porosity to glacier ice. Dr. Croll and

others do the same. They seem to have forgotten or overlooked some of the earlier investigations of Charpentier and Agassiz, proving that, excepting the "blue bands," the ice of glaciers differs materially from ice obtained by the ordinary freezing of still water. In the summer of 1842 I visited M. Agassiz at his "Hôtel des Neufchâtelais," a tent built on a huge boulder on the Aar Glacier, and there had some interesting opportunities of practical study under his guidance. One of the most interesting of these was afforded by a tunnel which was excavated at a considerable depth below the surface of the glacier, by descending a large crevasse, and cutting what miners call a drift, or horizontal passage, into the ice. This terminated in a "salon" or expanded excavation, furnished with a bench, on which the student might sit at ease and examine the crystal walls and roof around him. The porous structure of the ice was thus shown to depend not upon mere microscopic crystals, but of granules comparable to those of rice pudding, with interstices through which water was visibly filtering or trickling, its motion being rendered more distinctly visible by the fact that bubbles of air were also entangled between the pores, and these were moved by the flow of the water. Not only water and air bubbles, but minute black insects resembling *lepidisma* or *podura* were moving about and apparently living at ease in the pores near to the face of the cavern walls. bottom of the glacier where it rests upon its rock bed. Another downward moving action has been recently explained by Dr. Croll. It is that of an actual downward transfer of the substance of the glacier by the regelation above described. Every particle of water which descends as water thawed on the surface, and becomes ice refrozen lower down, represents a downward motion of so much of the body of the glacier.

Thus we have the down-flow of a plastic mass, the down-thrust of a mass expanding interiorly, and the down-growth of regelation, or solid convection downwards, all conspiring to move the glacier in one direction, viz. from its upper source towards its terminal outlet.

If the above description of glacial forces is correct, the flowing of glaciers should be demonstrable by their actual and visible motion. This is the case. All glaciers move or flow slowly down the valleys containing them, and this motion has been carefully investigated. It is found to resemble the flow of a river, being more rapid at the middle than at the sides. It increases with the slope, and varies with the temperature, being much faster in summer than in winter, during the day than at night. It varies from two or three inches to two or three feet per day. The plastic nature of the ice is strikingly shown when the containing valley, after narrowing downwards to its mouth, suddenly terminates or opens out upon a plain or wide extended slope. The glacier that was at first confined between the walls of the narrow valley now spreads out fan-shaped over the plain, or slope, exactly as a stream of volcanic lava, or a torrent of mud, spreads out under similar conditions. Glaciers, like rivers, have their main streams and their tributaries. It is quite common for several narrow upper valleys to pour their ice streams into a lower and larger valley, and thus combine to form a great glacier.

The analogy between the glacier and the river does not end here. Rivers wear out channels for themselves, partly by their own very gentle friction, but mainly by that of the pebbles they carry down with their stream. The material they thus grind away from their upper courses is deposited lower down, where the rivers spread out into deep open valleys and form lakes, or where they die out in the sea. The glacier does the same, but with greater power and effect. It bears the whole of its great weight upon its rocky bed, and grinds and gnaws it as it creeps along.

Its own bite is but mild, on account of its natural slipperiness, but as it proceeds it catches all the fragments, great and small, that alternate freezing and thawing can separate from the rock walls of the valley. Some of these find their way to the bottom of the glacier, are bedded in the ice, where it rests upon the rock, and there act like file-teeth or plane-irons upon the bottom of the valley, which thus becomes filed or planed down.

Whenever a glacier recedes (as many glaciers do at intervals), and exposes its bed, this bed is seen to be polished by the ice and the minute sandy particles, and grooved and scratched in parallel lines by the larger teeth. This smoothing and parallel striation are so characteristic and decided, that by such vestiges we are able to recognize the paths of ancient glaciers that have long ago ceased to exist.

Where a file or plane has done its work there must be filings or shavings; the matter thus ground from the rock

must be very fine, and must go somewhere. All ordinary glaciers are sources of rivers of greater or smaller magnitude. A rivulet flows through a tunnel at the lowest part of the bottom of every glacier, emerging from an icy arch at its foot. Such rivulets are always more or less turbid or milky, owing to the abundance of the rock filings they contain. These suspended particles are carried on and deposited *somewhere*, according to the circumstances of the rivulet.

Besides this fine dust, there are the larger pieces of rock that formed the teeth of the file, and the rock fragments that rest on the surface of the glacier, forming its "*moraines*." A familiar example will best explain the nature and formation of these.

The Mer de Glace moves at an average rate of about sixteen inches daily. This glacier, with its tributaries, is about twenty miles long, and a block of stone would be about two hundred years travelling from the top of the glacier to the end. Such a block now discharged at the bottom must therefore have started at about the time of the foundation of the Royal Society, and have been travelling ever since. Fragments are continually falling on the glaciers from the precipitous walls of the sides of the valley through which they flow. At the foot of precipices, where there is no glacier, there is usually a talus, or heap of stones, the accumulation of ages, each fragment resting where it fell; but when a stone falls upon the glacier it moves on, the next takes its place behind this one, and thus a line, instead of a talus or heap, is formed. According to the nature of the valley through which the glacier passes, the amount of precipitous wall, the friability of the rock, &c., &c., will the number of such stones be greater or less. These, as they are marshalled on each side or shore of the glacier, form the "*lateral moraines*." It often happens that two confluent valleys are filled with glaciers, which meet like the meeting of waters, and swell into a larger stream; the lateral moraines of the inner sides of each unite, and thus a medial moraine is formed. Finally, these moraines, travelling always onwards, reach, stone by stone, to the bottom of the glacier, and there they are deposited, forming the "*terminal moraine*," which sometimes amounts to a huge accumulation.

I am sorely tempted to continue this subject; to explain how great masses of rock float upon this icy sea, and are upreared on crystal pedestals; how an errant butterfly, chilled to death by the cold glacier blast, falls upon the ice with outspread wings, and how the sun so largely warms its fallen favourite as to dig for it a little grave, an ice-cup of oval shape with longer axis lying due north and south, and deepest at the north, and lying thus so accurately that the traveller without a compass might safely find his bearings; for by placing a stick in such a cup it would fall in a sloping line, indicating the meridian of the place. I should like further to show how this little cup deepens and grows to a large basin, and how the basin shallows afterwards, is next obliterated, and a symmetrical cone with an oval base rises exactly in its place, a temporary monument of ice, marking the grave of the dead butterfly. But an explanation of these curious phenomena would carry me over too much space.

I must at present only add that moraines and other glacier vestiges, such as smoothed and striated glacier beds, rounded hill-tops and eroded valleys, are found in such abundance throughout north Europe and other parts of the world as to reveal the existence of a geological period when all the north of Europe was ice-bound, as Greenland is at present, and when glaciers of great magnitude extended far to the south. This period has been called the glacial epoch. Further and more detailed research has indicated the existence of two or more such epochs during the later period of the tertiary age, with an intervening warm period or periods, and that human beings of a very savage type lived in Britain and other parts of Europe at this time.

The "till," of which I have already spoken as forming the bulk of the vast terraces that occupy the valley of the Nid, is the lowest and probably the most ancient of the glacial deposits. It presents a geological puzzle, inasmuch as its glacial origin is unquestionably proved by the planing, grooving, and parallel scratching of the irregular boulders it contains, while at the same time it differs in structure from any of the known deposits or other vestiges of existing Alpine glaciers. It corresponds neither to the lateral, terminal, nor medial moraines of ordinary existing glaciers; nor to the deposits of glacial rivers. It is thus an ancient glacial deposit, unrepresented by any modern glacial deposits that have yet been examined; and yet its importance and magnitude are immense. It is spread over thousands of square miles, even in the limited area of the British Isles, and proportionally over

other portions of northern Europe and North America. The magnitude of this and the boulder clay, which is of similar structure, and sometimes described as identical, vastly exceeds that of the sum of all the other glacial deposits. I think I may safely estimate its mass now lying on the land of Europe and on the sea floors around it as exceeding that which would be produced by planing down all the existing mountains of Europe to a smooth level of four or five hundred feet above the sea, and that a corresponding amount of ancient mountain matter has been swept away in producing it.

CHAPTER III.

Absence of moraines in Arctic Norway — Commercial travellers in the far north — Some of the results of popular education in Germany — Provisions and wines on board Norwegian steam-packets — Wine carte and tariff — Norwegian ale — Modern developments of steam communication in Norway — “Eyes and no eyes” — Evidences of universal glaciation — Minor glacier beds of a minor glacial epoch — The glacial heritage of the Arctic agriculturist.

Having introduced the reader to the general subject of glaciers, I may now take him so far into my confidence as to confess, that although I had carefully studied the researches of De Saussure, Charpentier, Agassiz, Rendu, Forbes, and Tyndall, besides questioning the Alpine and Scandinavian glaciers themselves, and working out the vestiges of ancient glaciers in these countries and in Wales, I had, previously to the publication of Mr. A. Geikie’s valuable volume, ‘The Great Ice Age,’ but a very imperfect knowledge of the magnitude and importance of that remarkable deposit, the “till,” which I have already described as forming the basis of the terraces of the Nid valley and as a geological puzzle.

On reading the first edition of Mr. Geikie’s book, just after its publication, early in 1874, a theory of the formation of the till, differing from that which Mr. Geikie advocates and those which he controverts, suggested itself; one which involves a view of the ancient glaciation of Europe rather different from that which is generally held, and which at once threw a strong light upon some of the difficulties I had encountered during my previous visit to Norway; one of the most prominent of which is the scarcity of moraines in Norway and their especial absence in Arctic Norway, where I expected to find them so abundant. Readers of ‘Through Norway with a Knapsack’ may remember that I only described one Arctic moraine, that at the Oxfjord station. I looked for moraines with especial eagerness all the way from Trondhjem to Hammerfest, and all the way back again, and only saw this one, although the whole journey included a panorama of the mouths or outlets of hundreds of glaciated valleys, just the places where moraines should abound.

I saw neither terminal moraines at the mouths of these valleys, nor the vestiges of lateral moraines on their flanks. Forbes appears to have been similarly disappointed, though he does not pointedly express the anomaly. One of my objects in revisiting Norway was to test my new theory, and one of the first demands it made was that I should find the till at the *lower* part of the great terraces. As the reader already knows, I found it accordingly as the basis of the terraces of the Nid valley; and besides this, I observed another confirmation in the fact that, so far as I could learn from the sections made by lateral rivulets, each of the terraces was topped or floored on its flat upper surface with a loose deposit, such as might be formed by the breaking up and redeposition of the stiff stony clay which forms the lower portions of each terrace.

As the proprietor of an original theory is usually an intolerable bore, I will say no more about mine at present, but let it exude spontaneously as I proceed.

We were at Trondhjem, belated by the unpunctual ‘Arcturus,’ when I started upon this glacial outbreak. The 15th and 16th July were spent in exploring the town and the Nid valley. Instead of waiting a whole week for the next packet that goes round the North Cape to the Varangerfjord, we determine to proceed northwards by the Danish packet, which runs between Stettin and Tromsö, calling at many intermediate stations. We hope by this means to

catch the midnight sun at Tromsø and there await the North Cape packet. This will add to our Arctic experience, and enable us to see more of the Lofoden islands, as the Danish boat crosses to these and stops at a few of the island stations. The North Cape packet proceeds directly without crossing.

We start accordingly in a well-appointed vessel, far superior to the old 'Constitutione,' in which I was a passenger in 1856. In the saloon is a good piano, and as there were several Germans on board, the piano was by no means idle. The majority of these Germans were commercial travellers, and, as usual, were well-educated gentlemen, speaking three or four languages, good pianists (though rather thumpy), reading music freely, able to play difficult pieces at sight, and better acquainted with *English* literature and *English* history than an average B.A. of Oxford or Cambridge. When we compare these with the same class of our own countrymen, the contrast displays our general educational inferiority in very humiliating distinctness. Those of our middle classes who complain of the number of young Germans who find their way into our commercial houses, and elbow aside their English competitors, will do well to consider whether they are fulfilling their sacred duty as parents when they consign their sons to the teaching of a clerical or classical schoolmaster, who can only keep them down to his own intellectual level, by devoting the best years of their life to the declension of Latin nouns, the conjugation of Greek verbs, and the other educational barbarisms of the effete and worse than useless monasticism that is not yet stamped out of our grammar schools and ancient universities. Why, should an *English* boy be crammed with the demoralizing details of the filthy Greek mythology, of the foulness of the Roman emperors, and of the butcheries of Roman conquests, while he is kept in gross ignorance of the literature and the constitutional history of his own country, and of the complex organization of modern society, which Adam Smith and his successors have unravelled. I speak only of these *now*, without reference to physical science, because the defenders of the monkish inheritance of our old universities have invented the feeble pretext that the classics supply the study of literature and humanity, which physical science omits.

Three substantial meals are served daily on all these coasting packets, at an uniform, fixed, and printed tariff. The "frokost," or breakfast, the charge for which is 36 skillings = about 1s. 4d. English, usually consists of one dish of hot fish and one of meat, handed round by the waiter, besides sundry shavings of German sausage, pressed meats, &c., that are freely spread in small dishes upon the table. Tea and coffee are also served, but charged separately at 8 skillings = 3½d. per cup. The tariff for dinner is 60 skillings = about 2s. 3d. It usually includes soup, fish, two dishes of hot meat, or one of meat and one of poultry or game; and a dessert consisting of cakes, like our sponge and pound cakes, almonds and raisins, and the fruit of the season and locality; cranberries, bilberries, and molteberries, with cream, being the most characteristic. Besides these, there are the usual shavings of cold meat and sausages in plates on the table, which is further decorated with growing flowers. We were abundantly supplied with delicious lobsters between Bergen and Trondhjem.

The tariff for supper is the same as for breakfast, which it resembles, excepting that the regulation only promises cold meats. Tea and coffee are served with this, also on the same terms. Both at supper and breakfast wine and ale are served, and preferred by many of the passengers.

Coffee is prepared after dinner and brought on deck for those who choose to take it.

I should add, that in Norway most people dine at dinner-time, i. e. at about 1 or 2 p.m., and those who find it convenient to do so are not sufficiently genteel to call it "*luncheon*;" 7 or 8 p.m. is the usual supper-time, and, however substantial the supper may be, it does not bear the nickname of "dinner."

There is an abundant variety of wine on board, as will be seen by the following copy of the wine carte, usually suspended in the saloon of these vessels.

"PRIIS COURANT

For Restauraterne ombord i det Bergenske Dampskibs Selskabs Skibe.

dol.

skill.

s.

d.

Rodevine.—

St. Julien, per fl. spd.

0

72

= 2

9

Ditto, half

0

36

= 1

4½

Pontet Canet

0

96

= 3

6

Ditto, half

0

48

= 1

9

Chateau Larose

0

108

= 4

0

Leoville

1

0

= 4

6

Brant Mouton

1

36

= 5

10

Lafite

1

60

= 6

8

Burgunder.—

Nuits Romanée

1

60

= 6

8

Sautenay

0

96

= 3

6

Hvide Vin.—

Sauterne

0

72

= 2

9

Chateau Yequem

0

108

= 4

0

Rhinsk Vin.—

Hocheimer

1

0

= 4

6

Rudescheimer

1

60

= 6

8

Johannisberger Cabinet

1

96

= 8

0

Champagner.—

Cliquot

2

0

= 9

0

Sillery

1

60

= 6

8

Oeil de Perdrix

1

60

= 6

8

Port Viin.—

Fin

1

0

= 4

6

Ditto (gl. 16 skill.)

1

36

= 5

10

Madeira.—

Superior (gl. 16 skill.)

1

36

= 5

10

Ditto

0

108

= 4

0

Sherry.—

Amontillado

1

24

= 5

4

Old Pale (gl. 12 skill.)

0

108

= 4

0

Diverse Hermitage.—

Blanc

1

0

= 4

6

Malvasier

1

24

= 5

4

Paraxete

1

24

= 5

4

dol.

skill.

s.

d.

Bruslimonade

0

16

= 0

7

Sodavand

0

12

= 0

5½

Ditto med Cognac

0

16

= 0

7

Porter, half fl. 30 skill

0

48

= 1

9

Bayersk Öl

0

12

= 0

5½

Cognac (gl. 8 skill.)

Armagnac 6 skill.

Rum, 6 skill.

Scheidam Genever, 6 skill.

Acquavit Lysholmen, 4 skill.

Acquavit Passaret Linien, 6 skill.

Bitter, 6 skill.

Liqueur (Curaçoa eller Anisette), 12 skill.

Punch (Toddy) af Chaloupin Cognac, per glas, 20 skill.

Ditto af Mörk (Engelsk), 24 skill.

Ditto af Armagnac, 16 skill.

Rum eller Arrak, 18 skill.

Viin, 10 skill.

Limonade, 12 skill.

Æggedosis, 24 skill.

Kaffe en Kontorkop med Tvebakken, 10 skill.

Ditto eller The en Kontorkop, 8 skill.

Ditto en leden Kop, 6 skill.

Chocolade stor Kop, 12 skill.

Cigarer, 6-4 skill. per stk.

Kort tvende spil, 72 skill.

I should add that the tariff for second class is

skill.

s.

d.

Breakfast of beefsteak and cold meat

30

= 1

1½

Dinner, two dishes hot meat

48

= 1

9

Supper (undefined)

24

= 0

11

Liquors same as saloon.

My experience of the wines is but limited, but, so far as it goes, it indicates that they are what they are named, and of good quality. Of the ale I can speak lovingly, and with full confidence. It is bottled, is effervescent, and similar to Bavarian beer, but with rather more body than that of the beer gardens of Munich. It has a peculiar resinous flavour, which, at first, is rather disagreeable; but, after a short education of the palate, this is usually

enjoyed; so highly in some cases, that luxuriously-minded people who have made its acquaintance in Norway have it sent to England from Christiania. This flavour is said to be purposely added by the use of fir cones by the brewer, but I suspect that it is really due to barrelling in casks made of the native pine.

For two years previous to making this journey I had been troubled with boils that seemed incurable, and was recommended to take pitch pills. Pitch being crude rosin, I took the liberty of modifying this prescription by substituting resinous Norwegian ale for the pitch pills. Either the ale, or the bracing northern air, or the two combined, had the desired effect, as the boils which I had on starting were arrested in their development; finally disappeared before we reached the Arctic circle, and have not returned.

The prices of the above wine list are stated in specie dollars and skillings. One specie dollar is equal to 4s. 5½d., and a skilling a little less than one halfpenny, i. e. 27 skillings = 1 English shilling.

Steam-packet communication on the coast has greatly developed since my first visit. Then there was but one service to the Lofodens and Arcticstations, and its limit was Hammerfest. Those who desired to reach the North Cape had to make the journey from Hammerfest in small open boats by sailing and rowing.

Now there are several distinct services, the particulars of which, for 1877, I have given in Appendix II. These may serve as a general guide for a few years longer; but those who desire the latest information on this subject may obtain it from the 'Norges Kommunikationer,' which is published monthly at Christiania. Copies of this are usually obtainable from Messrs. Wilson, shippers, Hull, or from T. Bennett, of Christiania, who supplies it with his 'Handbook,' which is published annually in June, and contains all the postal regulations for the forthcoming year, particulars respecting the stations, &c., and besides these a vocabulary of the Norsk words used in the 'Kommunikationer,' by the aid of which it may be deciphered. The price of his 'Handbook' is, I believe, one dollar, or 4s. 6d. English.

The route now taken being the same as that described in the account of my former visit, it may be supposed that I have nothing further to say concerning the physical features of this grand coast. This, however, is not the case, for although the rocks and mountains themselves remainunaltered, yet to my vision they now present some interesting features that were unseen in 1856.

Between that time and the present my own direct study, and the general progress of knowledge, has removed the degree of scepticism with which I once regarded the bold speculations of those geologists who were early in defining the vast magnitude of the glaciation of the northern hemisphere during the great glacial period before referred to. Thus, in my first visit, I looked merely for moraines and scratches, such as I had seen in the neighbourhood of existing Alpine glaciers, while this summer the vestiges of universal, as well as of local glaciation, equally occupied my attention. The fact that I can see so much now that was quite unnoticed eighteen years ago, curiously illustrates the effect of education in enlarging the range of our powers of physical observation. To know what to observe, when and how to look for it, and to be able to recognize it when seen, is one of the most important qualifications of the traveller, and is that wherein intelligent guidance may be of the greatest service.

We steamed as before through the Trondhjem and Skjoren fjords, along the coast, stopping at many stations, and then plunging deep into the Namsenfjord, winding through it and out again to sea, by the Naero channel of the Vigten islands, and reached Lekö about the next midnight.

All the rocky hills hereabouts, varying from mere stony knobs just rising barely above the sea, to mountains of 1000 or 2000 feet in height, display very strikingly the tremendous agency of the great ice sheet that once overwhelmed and swept across them. They have all lost their original angularity, that angularity which is always displayed by such rocks when they are simply worn, split, and riven by atmospheric agencies, by running water, and by the freezing of the rain or snow water that *directly* falls upon them, and leaves them alternately wet and dry, frozen and thawed.

It is easy to understand, that if such rocks had been overswept by a vast ice sheet, their original angles must have

been crushed, scraped, ground, and otherwise rounded down, according to the depth of the glaciation and its period of duration; and further, that if long ages have elapsed since this great ice covering melted away, there would be indications of a subsequent renewal of the atmospheric weathering, and a consequently proportionate degree of superficial angularity on the most exposed surfaces. This is exactly what I now see displayed on a magnificent scale, and quite universally, A Glaciated Coast Channel along the whole line of this coast, but which was invisible when seen by the same eyes in 1856.

All the hills, not exceeding the height above named, are hog-backed or pudding-shaped, with warty lumps where once were angular peaks, and with wavy ridges in the place of primeval craggy ledges and terraces. The technical name for such rounded rocks is *roches moutonnes*, from their resemblance to the backs of sheep. But these curved outlines are broken in various minor degrees by modern weathering, or by the sawing of modern torrents and their companion pebbles.

Besides this rounding, which is so universal as to determine the general characteristic aspect of the country, there is another very marked physical feature, which not only escaped my observation in 1856, but, so far as I can learn, has remained equally unnoticed by anybody else, although it is extremely interesting: and instructive, as affording an elegant and independent evidence of the existence and long duration of a subsequent glacial epoch much milder than that which overswept the whole country and rounded so effectually its mainland and insular rocks.

These are little *flat-bottomed* valleys or slopes, occupying nearly all the main hollows between, the larger of the lumpy hills, and coming down directly to the sea. Some are mere gullies, others are of considerable width, and many appear from the steamer to outspread upwards, where their limits are hidden. *All of these are more or less cultivated, and constitute almost the only farm land of this part of the coast.* Most of them have buildings of some sort upon them; hay houses, cattle houses, or farmhouses, and the largest are the stations at which the packet stops. Many are carpeted with a beautiful verdure, which, from a distance, appears as smooth as a bowling green. They all reach the edge of the sea, *and there is a shingle, boulder, or gravel beach at the foot of every one of them, and no such beach anywhere else in the neighbourhood.*

I have no hesitation in pronouncing them all to be glacier tracks, and that their present configuration is due to the erosion of true glaciers. The beaches are certainly not the terminal moraines of the glaciers that planed these little Scandinavian oases; their material is not sufficient in quantity, nor is it heaped up after the manner of a terminal moraine that has borne the thrust of the occasional advance of a glacier. It simply consists of the rock fragments that rested on the surface or was bedded in the substance of the ice, and which subsided where it now lies when the glacier melted away. I observed this summer a similar deposit covering the Dovrefjeld, and shall have more to say concerning it when we get there. The terminal moraines of these glaciers, if any exist, must be farther forward, deeper down, somewhere under the sea. The land must have had a greater elevation above the sea during the lifetime of these glaciers, or, more probably, they may have extended out to sea, and have terminated by floating off in icebergs, like those that at present fill and overflow the lower valleys on the coast of Greenland.

Wherever I had an opportunity of examining these farm patches, I found that the floor of the glacier path forming the subsoil of the pasture, or the oat, or rye, or potato field, is composed of this glacier gravel or boulder sand, but not so deep as that on the Dovrefjeld.

Hundreds of these small glacier beds are visible from the packet between Trondhjem and the Arctic circle. They are especially characteristic in the Namsenfjord, where the rough sketches for the engravings on the next page were taken. They are remarkably well displayed near Yaldersund.

It must be understood that the glaciers which planed these little valleys and deposited the basis of their soil existed when the great ice sheet of the great ice age that rounded the hills above them had thawed away and left the general outline of the country nearly the same as at present; but the climate was still so much colder, or so

much more humid than at present, that the snows which fell upon those hills in winter was greater in quantity than the summer sun could thaw. There was thus a local overflow of snow, which made its way downwards, and, lodging in the valleys, there became compressed, thawed, and refrozen into glacier ice, which crept along, following every slope until it reached the sea, on the shores of which its final work is now so abundantly and curiously visible.

Glacial Farms. These glacier tracts show that this later glacial period was not a merely temporary condition that existed only while the great ice sheet was thawing, but that it must have endured for ages with little variation, and formed an epoch of itself; for a great deal of work has been done in shaping their channels, not by great glaciers continually becoming smaller, but by comparatively small glaciers of long duration and little variation of dimensions. This evidence is important, as it bears upon a critical period of the world's history, about the time of man's first appearance upon the scene.

These little glaciers performed a leading part in the work of preparing this part of the world for man's reception. Without their agency little or no agriculture would here be possible. Beyond the trees that strike their roots into rock crevices and thrive on the ledges of the steep hill-sides; the saxifrage, with its grape-like bunches of hardy flowers drooping over the precipices; the scurvy-grass, the winter green, and their companion Alpine plants, there could otherwise have been no vegetation here. The mainland would be as barren as the smaller Lofoden and other rocky islands of the neighbourhood, where there was insufficient area of hills to supply materials for such glaciers, and where, at the present time, the inhabitants reap no land harvest, but rely entirely upon that of the sea. The hardy farmers of all this Nordland coast, the peasant freeholders who till the only pastures and arable lands of this part of Norway, are living upon an inheritance bequeathed to them by glaciers; they are the heirs and successors of ice and snow, and emulate their predecessors by their steady, dogged, unconquerable industry.

All "the rich green fields and substantial farms," which in 1856 I observed and described as so remarkable a feature of latitude 64½, I now see to be the beds and deposits of ancient glaciers, just as the great plains and fertile valleys of southern lands are the beds and deposits of rivers and lakes. That their origin, now so obvious, should have been thus completely hidden from me, and have escaped the attention of other observers, is a curious and suggestive fact, indicating that much more remains to be done in the study of ancient Arctic glaciation. I am satisfied that careful investigation of the details of these minor glacier-beds, and their relations to the more general glaciation of Scandinavia, will throw much light upon the still open questions of the existence of one or more interglacial periods, and the maximum magnitude of the ancient Arctic ice sheet.

CHAPTER IV.

"A troubadour from distant lands" — The concerts of the northern cod-fishers — A vindication of street organs — Their superiority to the pianoforte, and the reason of this — A suggestion for pianists — Torghatten — Dimensions and origin of the tunnel — Fraudulent claimants to the legendary estate of the Seven Sisters — Temporary success of the impostors — Their final detection and the reinstatement of the just heirs — Structure of the Seven Sisters and origin of their family likeness — The Hestmand again — Bodö — A sea beach, sea bottom, and great plain of surface "*till*" — Arctic shells — The Lofodens — Varying limits of glaciation — Reasons for believing that the ancient extension of Scandinavian glaciers has been greatly overstated — How to see the Lofodens and obtain bracing brain-rest — "Confidential Peak."

We steam on all day along the coast up and down those minor fjords that notch the map, and at the entrance or bottom or mid-part of which are stations where we stop. We plunge deeply into the bowels of the land at Namsen, where the fjord is a long and winding estuary, to Namsos and other stations, all nestled on these glacier-bed pastures and surrounded by the pudding-shaped rocks that prevail throughout, and form the islands, promontories, and minor inland mountains of all this coast from Trondhjem to the Arctic circle.

Among the passengers landing and embarking at these stations was an Italian organ-grinder. He came on board from one of the green glacier beds, containing about half-a-dozen houses, and landed upon another similarly peopled. He was a merry, careless dog, and grinned with all his broad white teeth when I saluted him in his native tongue. Like the rest of these modern *trovatore* who play organs, his motherland is the “paese di Genoa.” Those that play concertinas and sing are Calabrese; the pipers come from the Abruzzi; the makers and vendors of plaster casts all hail from the “Bagni di Lucca,” and the glass workers of Hatton Garden come from the plains of Lombardy, “vicino di Milano.” They are all abundant enough in the Italian quarter of London, in and about Leather Lane, but I little expected to find a specimen here on the Arctic circle, and proceeding farther north. He told me that the farmers and the “pescatore” hereabouts give him a hearty welcome, free quarters, as much as he can eat and drink, and enough small money to pay his steamboat fare from station to station; that he spends his summers in the North, and works southward as the winter approaches; that the Norwegians have better taste and more love of music than the French and English, as his concerts here are not given *al fresco* in the public streets, but in the best room of the principal residence of each station, to decorous and attentive audiences; each of his auditors contributing a small coin on entering or leaving the concert room. He evidently performs the same function here as his fellow countrymen and professional brethren in England, who at the close of the opera season in London form themselves into travelling companies and give select concerts in the provinces. “Reserved seats, 7s. 6d.; unreserved floor, 2s. 6d.; galleries, one shilling.” His organ barrel, like their stock programme, is set with operatic selections, including the most simple and melodious morsels, that all, excepting the soulless musical pedant, can appreciate and enjoy.

Believing as I do in the elevating influence of good music, and having a profound respect for street organs, I was delighted to meet this missionary of southern melody carrying his educational machinery so far north. His “box of whistles” is carefully tuned; his music, although somewhat bald and mechanical, is at any rate correctly and consistently rendered; his audiences are not condemned to listen to drawing-room slaughter of elaborate compositions by performers incapable of understanding the intent of the composer; nor the melancholy murder of sweet melodies by ill-taught singers, who imagine that drawling and dragging and moaning on every note is sentimental and expressive.

Few outbreaks of the affectations of pedantic ignorance have been more ridiculous than the persecution of Italian organ-grinders on the ground that their music is painful to sensitive lovers of music. It may be so to a calculating machine who has no music in his own soul, and to whom all sounds are noises, but to a really delicate musical ear there is no form of vulgar music less liable to offence. On a well-made barrel organ every melody is played in tune; on a pianoforte every melody is necessarily out of tune; the reason of this difference being that in the well-constructed barrel organ only one key is attempted, and every note is correctly tuned to the just intervals belonging to the scale of that particular key. This is impossible on the piano, which professes to render every key with only thirteen notes to the octave, and therefore the skilful tuner makes the best of it by “tempering,” i. e. dividing the error between all the keys and rendering it too small to be detected by vulgar ears, or those that are disgusted with a correctly-tuned barrel organ.

It is not every street organ that is thus tuned, but most of them are. It is only recently that I have discovered this. There were and still are a certain number of these instruments in London to which I have listened with peculiar pleasure, without knowing why, until quite lately it occurred to me that it may arise from the absence of the defect of temperament, which is inevitable in the piano, the ordinary church organ, and other similar instruments. By listening carefully to these particular street organs, I have satisfied myself that their peculiar sweetness is due to that diatonic accuracy which is the charming characteristic of fine singing and violin performance. Subsequent inquiry has confirmed this hypothesis. Scientific musicians will easily understand how this perfection of pitch is attainable in a barrel organ, where all the pieces are played in the same key, and the modulations are few or slight; but a little further explanation may be necessary to render my vindication of the much-abused grinding organ intelligible to all.

Everybody now knows that modern music is based on the diatonic scale major or minor, and that the intervals between the successive notes of that scale are not equal; that some are called semitones, and others whole tones. Musical teaching often stops here, in spite of Helmholtz, Ellis, and Tyndall, and leaves the pupil to suppose that all the whole tones are equal, and all semitones are just half of these. The piano, and other finger-board instruments, are constructed on this assumption, and thus C sharp and D flat are treated as identical, and represented by the same strings. In like manner there is no distinction between D sharp and E flat, or between C sharp and D natural, E sharp and F natural, and so on, with all the half tones. Besides this, the piano affords no distinction between major and minor tones and semitones, nor the difference of pitch, which even the same nominal note demands, according to the position in the scale in which it falls with the variation of key. All these delicate shades of difference, upon which so much of the sweetness of melody and the perfection of harmony depend, are cancelled in the pianoforte, and the errors, which in some keys would be glaring if the instrument were tuned accurately to any one key, are imperfectly concealed by dividing the error as equally as possible, and thus producing a chromatic scale which is out of tune for every major or minor key, and in which no modern music can be correctly played.

In order to obtain correct rendering of all the ordinary keys, the piano would require thirty-five notes to each octave, or a practical approximation might be attained by twenty-four. If, however, the performer were so luxurious as to have as many pianos as there are keys in which his music is written, and each piano were tuned as correctly as possible to one particular key, he might successfully compete with the one-key barrel organs which I have described. By tripping from one piano to another when a modulation occurs, he might even excel the barrel organ in accuracy of tune, to say nothing of his other advantages in expression and range of composition.

To show that the above remarks are not dictated by an ill-will towards the pianoforte, or any unfair favour to the grinding organ, due to the fact that I can perform on one instrument but not on the other, I will conclude these remarks with a practical suggestion, viz. that some of our modern pianists, who are scientific as well as mechanical musicians, such, for example, as Walter Bach, or Franklin Taylor, should demonstrate the uttermost capabilities of the pianoforte, by publicly performing on instruments specially tuned for the key in which the selected compositions are written, without any tempering, and having, if necessary, a second or third instrument on either side, which the performer could reach with or without a bound when an important or sustained modulation or change of key occurs. Such a performance would be most enjoyable; it would combine the expression due to the intellect and taste of the performer, with the just intonation of a high-class street organ.

We reach Lekö about midnight. The sun is down, but the daylight remains. I recognize my old acquaintance, Torghatten, the perforated insular mountain, by its shape when more than twenty miles ahead. At this distance it really appears like a broad-rimmed, round-topped hat, floating on the sea, but loses this shape on near approach. We commence our Arctic irregularities by sitting up until we reach it at 2 a.m. We see clearly through the perforation as we pass its eastern side.

The total height of this insular rock is 824 feet. The tunnel is 530 feet long, 66 feet high from floor to roof at its eastern entrance, 250 feet high at its western entrance, and about 200 feet in the middle. This curious tunnel or perforation slopes downward from east to west, and consequently is far better seen from the west than the east side, but the packet usually passes on the east, and thus the height of the opening is cut short by the visual covering of the farther end by the nearer floor.

I was told by a Norwegian gentleman that a geological committee of the Christiania University examined this tunnel, and confirmed my suggestion of twenty years ago, that it was excavated by the waves when the sea filled the mainland valleys up to the level of the upper terraces. The measurements recently made by Norwegian surveyors confirm this, so far as they go, as the roof of the tunnel varies from 650 feet high on the west side to 530 on the east, and the floor from 470 on the east to 400 on the west side. This corresponds as nearly as possible with the height of the upper terraces. The greater height of the roof and lower level of the floor on the

west side, making the tunnel nearly three times as high on the west as on the east, is just what should be expected, as the west side is that exposed to the open sea and prevalent winds, consequently to the greatest effective action of the waves.

My expectation that wave marks or the remains of marine animals might be found up there, has not, however, been fulfilled, for a sufficient reason, viz. that considerable disintegration of the rock has since occurred; fragments from the roof of the tunnel have fallen to such an extent as to bestrew its floor. Even from the steamer this friability of structure is evident, many hollows with overhanging semi-cavernous roofs or cornices being visible on Torghatten itself, and on the escarpments of the neighbouring hills, the granitic rock of which they are composed having apparently some degree of perpendicular lamination which favours its fracture from below upwards.

My readers of 'Through Norway with a Knapsack' will remember the Seven Sisters and their tragic end. Of course we looked out for them, but they were due at an inconvenient hour for dissipated passengers who had been watching Torghatten until 3 a.m. Nevertheless, on

July 18th we responded to the call of the captain, and rose at 7 a.m. to see them. I was much perplexed with their appearance. They had grown much stouter than when I saw and sketched them on my first visit—had become, in fact, quite matronly; besides this, had turned completely round, being now on the western instead of the eastern side of our route, and had drifted from the shore and floated out to sea. About ten miles farther on, we found seven more sisters, whose authenticity was affirmed by the mate, and at about noon a third family group appeared, which, when the captain and mate had gone "forward," the man at the wheel stoutly maintained to be the genuine ladies. These were not the only groups that might have been put forward as claimants. The family has increased since my last visit to seven times seven sisters, and all these bear some resemblance to the original sisters, but neither are the identical seven, all being stouter and shorter, and very round-shouldered.

Had I only described them I might have adopted either of these families and have escaped unscathed, but I had made a sketch of them, had been sufficiently rash to publish an engraving thereof, and bring on board a copy of the book containing it. The discrepancy between my sketch and all that we saw snubbed me very considerably. I continued to feel like an impostor until our return journey, when we passed the original Seven Sisters, retaining their original graceful proportions, and justifying every detail and particular of my sketch down to the cliff near the sea and the two groups of farm buildings. Instead of exaggerating their peculiarities, as I seemed to have done on our northward journey, it now became evident that my errors were all—as usual—on the side of modesty and moderation. The engraving, which is reproduced on the opposite page, fails to convey an adequate idea of their dimensions. They appear much taller. Their height, according to Van Buch, is 4000 feet, but this is, I think, an excessive estimate.

The veritable sisters stand on Alstenö, an island forming the west side of Vefsenfjord. The Danish packet takes a different course from that of the old 'Constitutione.' It passes through the Vefsenfjord to call at Vefsen station, instead of outside of Alstenö, and thus shows the backs of the sisters. The captain showed us the genuine family, but did not explain their gyration. My own geographical notions were muddled, having just turned out of bed. The fact that there are several similar groups, is probably due to similar agencies operating in each case; to the sweep of glaciers that have crossed a ridge of mountain, and excavated a row of similar hollows, leaving between them a row of peaks, all having a remarkable family likeness. The exact number of seven, like the seven hills of Rome and of Constantinople, is determined by the ingenuity that is exercised in counting them.

The engraving will enable the reader to understand how their formation may have been effected by glacier erosion. The original and all the spurious Seven Sisters stand in a row running at right angles to the general course of glacial outflow from the land to the sea. Supposing a steep mountain ridge to have originally occupied their place, the great ice sheet, coming from the east, must have been thrust against the eastern side of the ridge very forcibly, then reared up its slope by the pressure from behind, and finally forced *III. W. J. WELCH, SP* The Seven Sisters over the top. As all such ridges have some hollows, notches, or depressions here and there; the

main overflow would establish itself through these, and would wear and grind them down till those portions of the ridge lying between them would stand up in the manner shown, and the eroded valley or depression take its peculiar curved or wave-like form. This curvature is more marked in the original than in the engraving, especially on the hills to the right. The monotonous regularity of these successive U-shaped hollows is so offensive to artistic feeling of the picturesque, that I have failed to get them correctly copied on the block. The family resemblance of the seaward faces of the group depends upon the fact that they are the unaltered portions of the one face of the same original ridge.

At 9 p.m. we passed the Hestmand, who still is mounted as before, whose horse's ears are as gigantic as ever, who still wears his martial cloak and rears his head as high. He appeared even taller than before, but this was doubtless due to some misty clouds that hung about his shoulders and measured the height of the giant's head above the sea, about 1700 feet.

July 19th.—Reach Bodö, lat. $67\frac{1}{4}$, the nearest landing place to Sulitelma, at 3 a.m., and remain there all day. This is one of the principal Arctic stations, where all the packets make a halt of some hours. The best climbers of our party ascend the highest of the neighbouring hills to the beacon which marks its summit. The Lofodens, though at a distance of about fifty miles, are well seen as jagged angular spikes and crystal-like projections on the horizon. This angularity, which is most perfect in the southernmost or outlying islands, contrasts very remarkably with the general rounded outlines of the mainland mountains. The significance of this contrast will be explained hereafter.

The tide is low when we descend, and a considerable stretch of flat sea-bottom laid bare. There are no "sands" here, like those of our British coasts, where the waves have ground down the flint pebbles and other siliceous material to this condition; neither is there a beach, nor the rocky sea-bottom common on the Norwegian coast, nor the slimy deposit of a river mouth, but in the place of these is a very stiff grey mud or clay, in which are irregularly imbedded small pebbles, larger stones, and still larger boulders, many of which are smoothed and striated on one or more of their sides. It is true "till," similar to that which forms the lowest and most puzzling of the glacial deposits of Scotland, of which I have already spoken, and it evidently continues under the sea. High-water mark is shown by a ridge of shell fragments, which are so abundant that they reminded me of "Shell Ness," between Deal and Ramsgate. Cartloads of shells might be shovelled up here. I picked up one fragment of an echinus of about four inches in diameter. The spines still remaining upon it showed it to be a native of the Arctic seas. Above high-water mark are banks of wave-washed till, and the grass-covered plains around Bodö are evident extensions of the same deposit. They extend over some miles, and are remarkably flat and level. How have they been levelled? Were they thus deposited by the glacier, or have they been planed down since and how?

The subangular polished and striated rock fragments imbedded in this deposit clearly prove its glacial origin, and yet no such deposit is to be found in the course of formation by any of the existing glaciers of Switzerland, Scandinavia, &c. Its extent in Scotland is very great. It is there of very ancient date, and commonly overlaid by other deposits, glacial, alluvial, &c.; but here we have a superficial representative of this ancient till, which appears to have received no further covering than the shells above described, and the turf formed by the grass-roots. We must not forget that it is scarcely distinguishable from the deposit forming the lower portions of the terraces of the valley of the Nid, &c. As the reader will naturally suppose, this has some bearing upon my promised theory.

July 20th.—Sail from Bodö at midnight, and cross to the Lofodens in the early morning, calling at a few of the stations, just sufficient to afford us a general view of the characteristic physical features of these islands, the most prominent of which is the angularity before mentioned. During the whole of this journey I have specially observed the respective limits of the rounded and the angular contour of the hills that skirt the coast and form the islands we have passed. My object in noting this will be easily understood, as this limit of the rounding and smoothing marks the surface boundary, the height of the ice bed during the period of maximum glaciation. The existing angular peaks are those which at that time rose above the general ice surface just as the Grands Mulets,

the Rochers Rouges, &c., rise above the *nevé* of Mont Blanc.

At the southern portion of our coasting journey no such peaks were visible *to us* from the steamer (I say “*to us*,” because we had a great deal of thick weather, which may have hidden some that would have been otherwise visible). As we advanced northward—after leaving the Namsenfjord and since Torghatten—several were seen, and I estimated the boundary between the rounded and angular configuration, i. e. the ancient glacier coastline, to vary between 3000 and 4000 feet. This refers to the *mainland*, and must be taken for what it is worth as mere passing eye measurement, liable of course to a certain range of error. I have had some experience in the eye measurement of elevations, and have endeavoured to obtain what astronomers call the “personal equation” of my own limits of error, whenever an opportunity of comparing such estimates with accurate measurements has offered. I find that my *ordinary* limit of error is within 10 per cent. on either side of accuracy, while the *extraordinary* limit has in a few exceptional cases reached 20 per cent. The above and all other eye estimates of altitude given in this book must be taken as subject to such personality.

On crossing over to the Lofodens the limits of this glacial coast-line present a remarkable change, the significance of which depends upon the peculiar distribution of these islands. A glance at the map shows that they form an irregular line stretching from north-east to south-west, that the northern islands—such as Senjenö, Andö, Hindö, Langö, &c.—are larger and nearer to the coast than the southern islands; that these southern islands thin out and diverge from the coast till the southernmost, beyond Vaerö, i. e. such as Röst, &c.—are mere blocks of rock projecting from the sea, and as much as fifty or sixty miles from the mainland. These are the jagged angular spikes and crystal-like projections that I saw upon the horizon

from the hill above Bodö. Mr. Everest aptly compares them to sharks’ teeth.

Seen from considerable distances these southernmost and outermost rocks appeared angular down to the sea level, some of them rather overhanging or undercut on the northward side. My rough notebook sketch is copied below.

Outlying Lofodens.

At such a distance the dip of the horizon may have hidden some amount of rounding or glaciation.

The southernmost islands that we approached near enough for full examination (about fifty miles north of those sketched above) were obviously glaciated to about 100 feet above the sea level, and this elevation increased as we proceeded northward, and as the islands grew larger and approached the mainland. It reached by a tolerably steady graduation to about 1000 feet on Hindö, which, as the map shows, is about the largest of these islands, and of very irregular form and varying distances from the mainland. The height still goes on increasing as we proceed northward until it reaches VAAGÖ.RYSO. above 2000 feet in the neighbourhood of Tromsö, where the islands are almost confounded with the mainland promontories. The two engravings Vaagö and Rysö show these characteristic differences of glaciation; the first, of an island amid other islands, and about thirty miles from the mainland (see map); the second, where islands and mainland are only separated by narrow channels.

What does this indicate? Simply, that during the period of greatest glaciation the ice thinned out as it spread away from the mainland, and that the great Scandinavian glaciers of even, the severest period of the great ice age did not extend so far as those outlying Lofodens I have figured. Had they done so these rocks must have shared the fate of those cropping out in the main street of Stavanger, and of the thousands of others that are to be seen on every part of this coast near the mainland, *all of which* are rounded and shaven to hummocky hog-back or sheep-back ridges and mounds, some just level with the surface of the sea, and others rising in every intermediate degree up to such elevations as that of Torghatten or the Hestmandö, all of which are glacier-planed up to the heights already specified.

I dwell upon this because it leads to conclusions quite opposed to those of some of the most eminent authorities on this subject. Mr. Geikie, in ‘The Great Ice Age,’ asserts that the great glaciers of this region extended not

merely beyond the Lofodens, but right across to Scotland, and repeats this statement in many places with especial emphasis. Thus in summing up, on p. 561, he says, "All northern Europe and northern America disappeared beneath a thick crust of ice and snow, and the glaciers of such regions as Switzerland assumed gigantic proportions. This great sheet of land ice levelled up the valleys of Britain, and stretched across our mountains and hills down to low latitudes in England. Being only one connected or confluent series of mighty glaciers, the ice crept ever downwards and outwards from the mountains, following the direction of the principal valleys, and pushing far out to sea, where it terminated at last in deep water many miles away from what now forms the coast line of our country. *This sea of ice was of such extent that the glaciers of Scandinavia coalesced with those of Scotland and the north-eastern districts of England upon what is now the floor of the shallow North Sea*, while a mighty stream of ice flowing outwards from the western seaboard obliterated the Hebrides, and sent its icebergs adrift in the deep waters of the Atlantic." I have not seen the Hebrides, and therefore cannot say whether or not their original angularity has been obliterated, but have no hesitation in affirming that the configuration of the Lofodens distinctly contradicts the passage which I have put in italics.

The larger and northward islands of this group which approach the land display most decided indications of being overswept up to certain limits by the mainland glaciers, to which they probably contributed by independent minor glaciers of their own; but it is evident from the gradual lowering of the boundary between the general angular and general rounded form of these insular rock masses as their distance from the mainland increases, that the "mer de glace" of the continent thinned out seaward, and its outermost wall failed to reach the rocks of Röst, lying opposite Bodö, or even those of Vaerö, or Lofotodden. This is the more strikingly shown by the fact that directly between the Saltenfjord and Röst lie a multitude of small rocky islets within about half-a-dozen miles from the mainland, and these are "moutonné" (i. e. rounded like sheep's backs) most completely and without exception. The outflowing glaciers swept over them, but stopped short of the outlying Lofodens. There may have been ice extending much farther, even across to Scotland, but it must have been "floe ice," due to the freezing of the sea, such as our whalers and Arctic explorers encounter in Smith's Sound and in the Arctic Ocean generally, or like the "paleocrystic ice" that checked the poleward progress of the sledging parties of the recent Arctic expedition. Doubtless there were icebergs in abundance hereabouts, and probably a great boundary wall of glacier ice stretching across the northern portion of the Vestfjord or channel between the Lofodens and the mainland; but this wall did not reach so far as the southernmost islands, which are but fifty miles from the Scandinavian shore, and the gradual southward decline of the glaciation boundary indicates its gradual out-thinning seawards.

This view of the extent of the great ice age merely supposes a glaciation similar to that now existing in Greenland, but of greater magnitude, extending farther southwards. None of the Greenland glaciers now extend into the sea far beyond the mouths of the valleys or fjords down which they flow, and some of the most celebrated, such as the Humboldt Glacier, do not reach so far. It appears to me that the solvent action of the sea in limiting the possible outspread of glaciers into its domain, has been seriously underrated by Mr. Geikie and others who agree with him concerning the great seaward extension of the ancient land ice.

The glaciers that filled the Saltenfjord, the Skjerstadtfjord, the Sor Folden, and all the other inlets of the coast must have attained a great magnitude in order to plane down the fringe of rocks that extend from the coast to ten miles beyond, but they were insufficient to push so far as fifty miles out and overflow the southernmost rocks of the Lofodens, unless we suppose the submergence of the land to have been so great that the out-thrust mer de glace floated over these low rocks without grazing them. Even on this supposition it must have thinned out very considerably to account for the difference between its action in the distant and the near rocks of equal elevation.

This thinning out has an important, I may say, fundamental bearing upon all the theories connected with this subject, by showing that *even at the bitterest period of greatest European glaciation the waters of the ocean within the Arctic circle were warm enough to thaw with considerable rapidity the ice which had been accumulated on the mountains and in the valleys of the land.*

I argued long ago, i. e. when the first edition of 'Through Norway with a Knapsack' was published, that low temperature is only one of the factors in the formation of glaciers (see chap. xiv. p. 246 of new edition, where these reflections, suggested by the spray glacier of the Skeggedal, are reprinted without alteration), that an increase of atmospheric humidity, and of consequent winter snowfall, may produce the same effect as lowering of temperature.

The importance of this second factor in glacial climate is now generally admitted, and taking this into consideration it is quite possible that a great glacial epoch may have been produced with little or no *primary* lowering of the general temperature of Europe, or of the northern hemisphere, provided other causes combined to produce a considerable increase of atmospheric precipitation. This humidity would of course produce what I may call a *secondary* depression of temperature by the necessary action of the accumulated snow. I merely refer to the *possibility* of the glaciation being produced by the one formerly neglected factor, viz. increased humidity; but do not therefore contend that such was the case, believing that both factors combined actually to produce the effect; that the temperature of the northern hemisphere was lower than at present, but not nearly so low as is commonly supposed; and that this moderate depression of temperature, combined with a greater snowfall in winter, produced all the observed results. The lower temperature would favour increased precipitation, and the increased humidity of the air would resist the passage of the solar rays and greatly diminish the summer thawing.

Such a depression of temperature and increased precipitation must have occurred when the earth was in perihelion, at about the time of northern midsummer (it is now there at our midwinter), and when our winter was consequently longer.

The coincidence of this with a few other variations in the elevation of the land are, I think, sufficient to supply the two requisite factors of lower temperature and greater precipitation in sufficient degree to produce the past glacial epochs, and to reproduce others in the distant future.

I have already said that we only touched at a few Lofoden stations this summer, and thus lost much of that which I described in 1856, as so characteristic of these islands.

There is still a means of seeing the Lofodens as of old, or even more thoroughly. A special service of small packets plies between these islands, calling at a multitude of stations, and proceeding very leisurely. To those to whom a sea voyage has been prescribed, and who are in need of brain-rest, these inter-Lofoden packets afford an unrivalled means of obtaining bracing sea air; total change from the enervating influences of wealth and luxury; delicious renunciation of conventional and fashionable tomfooleries; and sea voyages without sea-sickness, as the grand channels through which the packet winds are land-locked. These packets are small; cannot accommodate a large party—such as ours with six ladies—but are otherwise all that is desirable for the objects above named. They are, in fact, public steam-yachts.

We had but little of the characteristic odour this summer. The cod harvest was nearly finished when we arrived; the liver boiling was over, and only a few stockfish were hanging in the sun. The export season had evidently ended, and these were but a small residue retained for home consumption.

Our most characteristic example of Lofoden scenery this year was in the neighbourhood of Svolvær station. There is a curious projection of the jagged rock a little to the north of the landing place, which appears like two sculptured figures leaning towards each other, head to head. One of the ladies named it "Confidential Peak."

CHAPTER V.

Tromsø — Our first meeting with Laplanders — Sleeping arrangements of fashionable visitors to the Arctic metropolis — The Hôtel du Nord — American "smartness" — The progress of Tromsø — Dissipated Laplanders — Arctic villas and luxuriant lawns — The difficulty of distinguishing to-day from to-morrow in the

Arctic regions — Programme of the midnight sun — Shopping in Tromsø — English goods cheaper than in London — The aristocracy and democracy of Tromsø — The Lapp camp in the Tromsdal — Critical examination of ladies' dresses — Commercial transactions with the Lapp women — Their political economy — Midnight cod-fishing — Victims to the pursuit of knowledge — Fish rissoles and fish puddings — Our *menu* at Tromsø.

July 21th.—Reach Tromsø about 2 a.m. and land, as usual, by means of a small boat. This boat takes us with our impedimenta to the foot of some wooden stairs mounting to a wooden landing stage. We are rather startled by inadvertently invading the domestic privacy of a happy family of Laplanders, who had spread some reindeer skins upon the platform, just at the top of the steps, and were sleeping soundly in the sunshine and main thoroughfare. We nearly stepped upon them, and, had it been dark, must have stumbled over them. The head of the family awoke, rubbed his eyes, sat up, and stared at us; his wife continued her nasal slumber-song quite undisturbed, and before we had landed all our luggage the whole family had returned to sleep. On our way to the hotel we passed other sleeping families, some on the beach, and some on the footpaths of the streets; a reindeer skin below and another above completing all the bed and bedding of these hardy little people. They were temporary visitors from the fjeld whose hotel expenses are very moderate, even at this period—the height of the Tromsø season.

A few were strolling listlessly about the streets. They wore their "*paesk*" or deerskin frock-coat, a rigid semi-leather garment, and from a short distance they appeared like double-spouted walking teapots, the spouts being the stiff outstretching empty sleeves, from which their arms were withdrawn to be hugged inside around their body. The Sunday frock, or "*gappe*" is quite different. It is made of a stout and very durable woollen material, called "wadmal" Each frock endures at least for a whole generation, and some are bequeathed to heirs.

After great difficulty we succeed in rousing the hostess of the *Hôtel du Nord*, i. e. of the hotel of Tromsø. Our first impressions of this house were by no means cheering, especially as we must remain four or five days in Tromsø, and we knew of no other refuge for so large a party. The resemblance to a common rough English public-house was unpleasantly strong. The remains of much drinking were on the rough wooden tables, and the hostess was sadly troubled with her difficulty in finding sleeping rooms. We had bespoken them by telegraph two days before, but this fact only increased her confusion and general muddlement; for a *young* American displayed his "smartness" by forcing his way into the house by a back door while we waited in front, and by taking possession of the best double-bedded room, locking the door, pocketing and walking away with the key. He further displayed his smartness by answering or nodding in the affirmative when the hostess asked him whether it was he who sent the telegram. This, as I explained to him—with the utmost possible delicacy of course—is not called "smartness" in England; we have a much shorter name for it. After much altercation, he was made to understand that pocketing a key does not convey a title to possession of the tenement it locks; but in Norway, as in other civilized countries, renders the pocketeer liable to the consequences well known to fall upon "im wot steals wot isn't 'isn." He finally repented his smartness, the better elements of his nature prevailed, and he became sufficiently ashamed of what he had done to give up the key and leave the house. We met him again, travelled with him for some distance, and found him in his general conduct a well-conducted, amiable youth. He is not the first American I have met who has made himself appear far worse than he really is by this miserably misdirected ambition to be "smart." The whole nation is similarly suffering. The Americans are far better than they appear on the outside, and will never be justly appreciated as a nation until public opinion in the States becomes sufficiently wholesome to treat all manifestations of smartness as vulgar and shameful dishonesty. Judging from the moral dignity of the majority of those I have met in travelling, I suspect that this desirable revolution of public opinion is rapidly progressing.

As soon as our hostess had recovered from the confusion of this invasion she gave us the best rooms at her disposal. During the whole of our stay she was most attentive. She achieved some great triumphs in the matter of cookery; supplied us with quite a sumptuous table, considering the latitude. She is a semi-French woman, a

Roman Catholic, placed in the hotel by the Catholic Mission, to whom the house belongs. The hotel, the hostess, and the Mission generally, are evidently unpopular in the town. In thus securing the only hotel, the Mission probably calculates upon obtaining considerable influence, but has not succeeded. There are scarcely any people in the world less likely to be won back to Romanism than the Norwegians. A commercial association for the cultivation and sale of water-melons would have about the same prospects of success in Arctic Norway as a Jesuit propaganda.

After the few hours of semi-sleep, which in Arctic summer time represents a night's rest, we explore the town. It has so much developed since my former visit that I had some difficulty in recognizing it. It appeared to me to have made greater commercial and general progress during that period than any town I have visited in Norway. This impression is fully confirmed by subsequent inquiry into its statistics. It was founded in 1794. In 1816 it had but 300 inhabitants. At the time of my former visit the numbers had risen to nearly 2000, and now they reach 5000. I may fairly venture to describe Tromsø as the metropolis of the Arctic world, as there is no other town of equal magnitude and importance anywhere within the Arctic circle. There were many Lapps sauntering about the streets; they were all Fjeld-Lapps, and had evidently just arrived on their annual visit to the town. Some were languidly negotiating with the Norwegian shopkeepers for the barter of reindeer skins, reindeer hair, ornamental fur shoes (*Komager*), feathers of ptarmigan, &c., for wadmal of Norwegian or Swedish manufacture, for meal, coffee, gunpowder, tobacco, hardwares, &c. The gentleness and timidity that I before observed is displayed even in their commercial proceedings. A few of them ventured to offer komager to us; and I was glad to find that they usually asked what appears to be a fair market price, and made no abatement. They were also selling skins and komager to sailors in the streets.

Some were indulging in wild dissipation; drinking coffee and eating buns at stalls, or rather tables and benches, placed on purpose for them in the main street. Their enjoyment of these luxuries was huge and obvious, and very delightful to contemplate. There was a happy out-on-the-spreesh expression on their faces. Like little children at a holiday feast, they held up their buns and displayed them to each other before taking a bite, smiling slyly all the while; and when they saw me watching them, at first looked downblushingly, but after a little while, when I made grotesque signs expressive of enjoyment of good things, they became quite sociable, and grinned heartily in full appreciation of my small pantomimic joke. Whenever I met them afterwards they saluted me with a grin of recognition, just as little children do to whom one has sung a comic song. The more I see of these little people, the more they appeal to my philoprogenitiveness. Would they were cleaner!

In the afternoon we walked to the summit of the island, where a Belvedere, erected for the king when he visited Tromsø, serves as a pleasant resting place, and commands a good general view of the many branching fjords and dark snow-streaked mountains around. We were much surprised at the luxuriance of the vegetation. The ornamental trees, which were planted around the Belvedere only a few years ago, have grown so tall that they hide the view to the northward. On the hill slopes are many pretty wooden villas, of modest dimensions, with ornamental gardens and croquet grounds carefully laid with gravel instead of grass. They do not mow their lawns here; all the grass of the garden grass-plots is full grown. I can easily understand this; for where the ground is snow covered during eight or nine months of the year, and the sun is below the horizon for more than two months, it would appear like sacrilege to cut down any vegetation except for food, and thus the beauty of a garden lawn is naturally estimated as proportionate to the quantity and depth of grass upon it.

Swings of elaborate architecture are erected in most of the gardens. Their dimensions show that they are not merely for children, but also for the luxurious enjoyment of the heads of the household, and the entertainment of guests on festive occasions.

To-day and to-morrow are so completely mixed up together in these Arctic regions that the dates of one's diary become curiously confused. In sober go-to-bed England it would be scarcely consistent with propriety to make midnight excursions with young ladies; but here I find myself rowing across from the island to the south-west mainland at 11 p.m. with a boatful of ladies, and climbing the mountain at the mouth of the Tromsdal, which

commands the best northward view for the midnight sun. This, the 21st–22nd of July, is the last day on which it is visible above the horizon here. As the northward horizon of Tromsö is mountainous, it is necessary to climb to the level of that horizon to see the midnight sun at this date. Among other provisions for the journey, I had included a good three-inch lens for concentrating the sun's rays, and the night was sufficiently clear to enable me to burn holes in hats and other dark garments at about midnight. These, of course, were retained as trophies.

The following programme of the midnight sun may be useful to those who contemplate a visit to Arctic Norway, and like ourselves find it difficult to leave England before midsummer. A free northern horizon is here assumed, but this is not always attainable. In its absence a hill somewhat exceeding the height of the obstructions on the horizon must be ascended. I say somewhat exceeding, because the refraction which renders the sun visible for some time after it has actually sunk below the horizontal line is diminished as we ascend. The figures below include the effect of refraction at the sea level.

Bodö, 67° 17'.

Tromsö. 69° 39'.

Vardö. 70° 22'.

Hammerfest. 70° 40'.

North Cape, 71° 15'.

Upper limit of sun

May 31 to July 8.

May 18 to July 22.

May 14 to July 26.

May 13 to July 27.

May 11 to July 30.

Middle or half sun

June 2 to July 10.

May 19 to July 24.

May 16 to July 27.

May 14 to July 28.

May 12 to July 31.

Whole sun

June 4 to July 12.

May 20 to July 25.

May 17 to July 28.

May 15 to July 29.

May 13 to August 1.

On the 22nd January the sun makes his first appearance over a craggy ridge to the southward of Tromsø, after an absence of more than two months. The inhabitants then keep holiday and celebrate his return with gun firing and much festivity.

During our stay here the ladies did a good deal of shopping and were well satisfied with the result. The unexpected and exceptional coldness of this summer created a demand for extra woollen shawls, &c. These were purchased at about the same prices as in London. Collars, cuffs, and such small wares, are also supplied in abundant variety in large and well-appointed shops at corresponding prices. The drapers of Tromsø compete successfully with those of London.

I purchased a Sheffield-made pocket knife of rather peculiar pattern for one dollar (4s. 6d.), and was somewhat surprised on returning to see the same knife marked at 5s. 6d. in a London shop window. To be thus beaten in the sale of an article of English manufacture by competitors within the Arctic circle is by no means creditable to London shopkeepers. The London shop in question was in the "West End," and is one of those established to supply the class of people who now deal so largely at co-operative stores. The shopkeepers of this neighbourhood may fairly ask themselves whether there is any natural connection between such defeats and the migration of their customers; and whether it is consistent with the natural course of things and permanent commercial prosperity that the distribution of such articles should cost as much as their production, which is the case whenever the retail price is double that which the Sheffield or Birmingham factor pays for them. The factor's prime cost represents the remuneration of the collier, the metal miner, the crude metal workers, the skilled artisans, and the various employers whose capital, skill, and energy supply the material, shops, and tools, and direct the labour of these producers. The factor's profit and that of the shopkeeper added together represent the cost of merely moving the finished article from the hands of the manufacturer into those of the final retail customer.

In Murray's 'Handbook' it is stated that "the vice of drunkenness prevails to a fearful extent among the lower classes of this place." During our stay of five days we saw no evidence of this. There was a noisy party at the hotel one night, but not consisting of the so-called "lower classes." On the whole, there were fewer indications of drinking than is usually displayed in towns of similar size in England. Using the term "lower classes" in what I regard as its proper sense, I may say that there were no specimens of such classes visible in Tromsø—no roughs, no beggars, no slouching thriftless outcasts, and, above all, no powdered flunkies displaying, by their gaudy liveries, the ostentatious degradation of their vulgar-minded employers. A general tone of quiet respectability pervades the whole community. There are respectable boatmen, respectable fishermen, respectable artisans and labourers, respectable domestic servants, respectable shopkeepers, with respectable assistants, respectable merchants, bankers, &c., but scarcely any useless idlers are visible, either of the pampered or pauper class.

The aristocracy of Tromsø are the shopkeepers, dried-fish merchants, and bankers; to these belong the villas and the swings before mentioned. "Consul" is the titular dignity that seems to be most respected here, and all the inhabitants appear to be very scrupulous in applying the title to "Consul Aagaard," "Consul Holst," and the others who have a claim to it.

During our wanderings about the town we were much indebted to the courtesy and intelligence of two well-

educated young men who spoke English, and whose acquaintance we made in the first instance in inquiring the way to the banker. They kindly offered further information, and to guide us to the pavilion or Belvedere before mentioned. They also accompanied us in other excursions. One is a gold and silversmith who had hitherto been a journeyman, but is now beginning business for himself; the other a shoemaker. Both are well-bred gentlemen, and well deserve the esteem with which they are remembered by all my six companions. On behalf of these ladies and myself I now thank them most cordially.

Of course we visited the Lapp encampment up the Tromsdal, a valley of the mainland, opening nearly opposite to the town. The difference between this summer and that of 1856 was strikingly shown by the condition of this valley. Instead of the oppressive heat and clouds of mosquitoes we had a cold damp atmosphere and clouds of Scotch mist. Although nearly a fortnight later, the snow had so recently thawed from the bottom of the valley that the path by which I had first walked was a deep mud swamp. Two English ladies, who were stopping at the Hôtel du Nord when we arrived engaged a guide to conduct them to the camp. They walked some distance up the valley, when the guide told them that it was impossible to proceed farther; that they would sink to their waists in bog, &c. They returned without seeing the Lapps. Some Germans who had succeeded in reaching the camp on horseback, reported on returning that they sank knee deep in mud, and that it was impossible for ladies to do it. Having had much previous experience of similar reports, and knowing that a valley has sloping sides as well as a swampy bottom, I resolved to disregard all these warnings and attempt the walk with my full complement of responsibilities. By keeping well on the slopes, considerably above the path, on the south side of the valley, we managed to reach the camp, not by any means dry-footed, but without serious inconvenience. The walk was longer and much more laborious than when the bottom path was dry and hard, especially as there remained above us, and sometimes on the level of our track, a multitude of snow patches from which small torrents were flowing. These little streams had to be crossed by jumping or balancing on boulders.

The Lapp huts appeared just the same as when I saw them before. I am surprised to find that these rude hovels can stand so long.

The men were away on the fjeld with the reindeer. The women and children who remained were more sociable than on the occasion of my first visit. The women were particularly interested in the clothing of the ladies; they examined every article, and made minute inquiries respecting the price of each. A sealskin jacket was especially admired, and its value fully appreciated. Brooches and other articles of jewellery were critically examined and valued, and their wearers proportionally admired. This admiration was, however, severely shocked when they came to the metal buttons, which, in accordance with current fashion, were abundantly displayed on some of the grey woollen dresses. The Lapp kone at first assumed, as a matter of course, that all these buttons were silver, and, on being informed that they were not, expressed their contempt very plainly, and were evidently inclined to regard us all as impostors. Silver buttons are usually to be found among the family treasures, the heirlooms of both Norwegian and Lapp families, and to wear buttons of baser metal resembling silver is regarded by them in about the same light as wearing a brass watch or pewter finger-ring would be among Englishmen.

We bought several pairs of the komager or Sunday shoes made of reindeer skin with the fur outside (those for common wear have the fur inside), embroidered with red and yellow braid, and stitched with reindeer sinews; also some spoons made of reindeer horn, and some of the sinew-thread, which is very strong; the finest is, I believe, well adapted for salmon lines.

The shoes cost $1\frac{1}{2}$ dollar (2s. 3d. English) per pair, the spoons 1 mark (about 11d.) each, and the sinew-thread $1\frac{1}{2}$ mark for a rather small skein. The women were quite firm to their prices; they only deviated when we proposed to make a purchase of several pairs in one lot. Instead of reducing the price in consideration of the wholesale nature of the transaction, they raised it. Half-a-dollar being the price of one pair, $3\frac{1}{2}$ dollars were demanded for half-a-dozen. At first I thought this was an arithmetical blunder, but found that it was not so. By taking two pairs from each of the three women who were competing in the market, we could purchase the half-dozen for 3 dollars, but if we took all the six from one, and thus nearly or quite cleared out her stock, she

demanded and firmly insisted upon the higher price.

At first sight this appears like a commercial absurdity, but further consideration of all the conditions of the bargain shows that these simple women—each in her individual capacity—were acting in strict accordance with a fundamental principle of political economy, viz. that *supply being constant, values vary with demand*. Her own supply is a constant or limited quantity, and therefore liable to acquire what Mill designates a “scarcity value.” This supply is simply the number she can make with her own hands. She is not a buyer who goes into the market, and by making large purchases can increase profits by a proportionate increase of sales. She and all around her, having felt the pinch of scarcity, the fear of shoe-famine instinctively rose in her mind when we proposed to purchase her whole stock, and therefore she clung to the last pair and demanded double price for it.

The odour of the huts was by no means so repulsive this summer as at the time of my former visit. This is probably due to the difference of the weather.

The gaities of Tromsö are not very numerous, especially in wet weather, such as prevailed during our stay here. Next to midnight sun and Laplanders, the principal excitement is fishing for codfish and haddocks. The time for this, as for most Arctic dissipations, is midnight, and accordingly I arranged with a faithful boatman, who served us during the whole of our stay, to provide lines and convey four of our seven to the best fishing ground of the fjord.

The lines are made of stout whipcord coiled on a wooden frame. At the lower end is a longlead plummet of 2 or 3 lbs. weight, and projecting at right angles from the upper part of this are two arms of whalebone, each about a foot long. To these the hooks are attached. The shaft of the hook is of tinned iron, rudely shaped like a fish, and bright. The hook is double, and very large in proportion to the fish. The line is let down until the plummet feels the bottom, and then the sportsman begins his labours by jerking it upwards with as long a pull as the arm can take. Bait is unnecessary. Presently a tug is felt, the line is hauled in, and a wretched flapping victim is found attached to it.

It is commonly supposed that the codfish mistakes the bit of tin for a fish, and swallows the ridiculous bait under this delusion, but my own observation of the results of this kind of fishing convinces me that this theory is a libel upon the intelligence of the victim. He is not so blind as his captors suppose, but falls a martyr to the pursuit of knowledge. He sees the glistening semblance of a new species, proceeds to investigate, and when he approaches is hooked by the jerking of the line through some part of his head: most commonly the gill-plates, not unfrequently the belly, the back, or the tail, but never by the *inside* of the mouth. With two lines, in about two hours, we caught twenty-one small codfish and six haddocks; the largest of the codfish weighed about 10 lbs.

Among the triumphs of cookery achieved by our hostess of the Hôtel du Nord was one worthy of record, prepared by pounding boiled or fried codfish, haddock, or other fish, in a mortar with egg, flour, milk or cream, and butter; making the pulp, or paste thus prepared, into balls, and frying with an outer coating of egg and bread crumbs. The same compound is made into puddings. We first tasted it here, but met with it afterwards on the North Cape packet. When properly prepared it forms an excellent dish, and is doubly estimable as affording means of economizing the unconsumed remains of ordinary dishes of fish.

Our hostess of the Hôtel du Nord charged at the rate of six marks per day (about 5s. 6d.) for each of us, during the four days we stayed at the hotel. This included board and lodging. We had substantial breakfasts, with fish and eggs, excellent coffee, and good white bread and butter. Dinners of soup, fish, meat, pastry, and dessert. The pastry was a huge sweet omelette, which we had regularly repeated, finding it so good on the first day. The dessert was (as usual in Norway) dried fruit, such as almonds and raisins, and cake. The central cake served on the first day was a work of high art; a Tower of Babel done in confectionery sponge, and composed of broad flat rings successively diminishing in diameter upwards, thus forming a series of circular galleries. We were too much overawed by its magnificence to think of eating it, but our hostess, discovering this, showed us how to attack the imposing citadel, by removing first the bottom ring, and thus leaving the superstructure unimpaired,

though gradually descending. As we worked upwards, the cake worked downwards, till we gained the summit on the fourth day. We had coffee after dinner, and a substantial evening meal. I should add that eggs are expensive luxuries at this latitude.

We were well supplied with potatoes here and throughout our journey. They are now grown in considerable quantities in Norway, even within the Arctic circle. Scurvy was once a fearful epidemic in Norway, especially in the Arctic districts. It is now very rare, and I suspect that this immunity is largely due to the introduction of the potato, which supplies the blood with some potash. The moltebeer is specially cultivated, or rather preserved when growing wild, on account of its antiscorbutic properties.

I was not a little surprised at the failure of the recent Arctic explorers to battle with this malady, which modern science has now placed so completely under control. If the lime juice is liable to be frozen as stated, why carry it at all on the sledging expeditions? Its efficacy is simply due to the potash it contains. Bicarbonate of potash, citrate of potash, or tartrate of potash can be carried in the form of crystals or powder, and dissolved when required. One pound of either of these would defend a dozen men from scurvy for a month.

During the first few weeks of my first visit to Norway, I suffered some ugly symptoms, due to a lithic acid diathesis, but was perfectly cured by taking daily an effervescing draught made with bicarbonate of potash and citric acid. Since that time I always carry bicarbonate of potash in my knapsack, and find it quite necessary whenever I take severe exercise with a stinted supply of fresh fruits and vegetables. In southern countries, where grapes, oranges, lemons, and salads abound, it is not required.

I have already described the evidence afforded by the Lofodens of the thinning down of the great ice sheet of the glacial epoch as it extended seaward. Another independent evidence is displayed at Tromsö, and well seen from the Belvedere. Tromsö is a small oblong island, lying between the mainland and the larger island Kvalö. It is separated from Kvalö by Sandesund, and from the mainland by the Tromsösund. The width of these two channels and the island together amounts to about four miles. The mer de glace has poured across this hollow, grinding down the island to its present modest elevation, and has then passed on to Kvalö. Now in the course of this short journey across the valley—which, allowing for the outspread of the hills on each side, is about six miles—the level of the ice has fallen about five hundred feet, as shown by the glaciation on the opposite sides. The difference is well shown by the contrasted engravings.

This inclination of 500 feet in six miles—about 1 in 60—would bring a glacier of 2000 feet thickness on the shore down to the sea level in an outward course of twenty miles, or less than half the distance between the mainland and outlying rocks of the Lofodens.

The Western End of Tromsö, looking across to Kvalö. Tromsö, looking across Tromsösund to the Mainland.

CHAPTER VI.

An exceptional moraine and glacier lake — Hammerfest — Consul Robertson — The North Cape — Cod-fishing — Knivskjierodden, the northernmost promontory of Europe — The Porsangerfjord — A glacier farm — General glaciation of the extreme north — Sverhouklubben and the Fuglebjerg — A wondrous colony of sea fowl — Abundance of animal life in the Arctic Ocean — The northern headlands of Europe — Vardö— Arctic market gardens — The northernmost fortress of the world — A moltebeer and eider-duck preserve — Political interest of the Varangerfjord — Russia and the Gulf Stream — A political interlude — The Vadsö whale fishery — An interesting but unsavoury visit to the whale butchery.

July 25-26th.—Leave Tromsö at midnight by the *Haakon Adelstein*, and proceed between islands and mainland, that are undistinguishable one from the other as we pass them, but are wild and grand on all sides. Although later in the season than on my previous visit, the snow was much more abundant and deeper. This improves the scenery in some respects, but hides the structure of the glaciers that we pass.

The terminal moraine at the Oxfjord station, which I have already mentioned as the only ancient example of an ordinary moraine that I have seen in Arctic Norway, was, of course, a special object of interest to me. Further observations showed that it does not merely consist of the heap of stones I noticed in 1856, which appears like a disturbed talus cut through and heaped up at its lower part, but that there is another moraine adjoining it, or in continuation with it, which is covered with vegetation, and stretches quite across the mouth of the valley. The Duke of Roxburgh, who is well acquainted with this neighbourhood, having spent sixteen summers in Arctic Norway, was one of our fellow passengers, and told me that this moraine forms a barrier that dams up the waters of a considerable lake abounding with remarkably fine char. I learned this just as the packet was starting, too late to go on shore even for a few minutes and obtain a view of this lake and the valley beyond. This I regret, as it might have revealed some explanation of the exceptional nature of this moraine. It would be interesting to learn whether it belongs to the greater ice age, or to that period of minor glaciation that fashioned the farm patches already described. The formation of the lake is easily understood in the latter case. It is only required that such a valley as one of those represented on page 52 should be of larger magnitude and of very gentle inclination at its lower part, so that the glacier should die out before reaching the present sea-shore. It would then deposit its moraine across the mouth of the valley, and this moraine would darn up the waters which such a valley must necessarily receive from the drainage of its hilly sides. Llyn Idwal in North Wales is a lake thus formed.

We reached Hammerfest at 5 p.m. Instead of progressing like Tromsø, Hammerfest appears to me to have declined somewhat since my last visit. The main street, the houses, and especially the hotel, have grown more dull and dingy, and there are fewer signs of activity in the port.

The most striking difference was the absence of the little people, the fisher Lapps. Instead of the fleet of boats, their owners and inhabitants, described in 'Through Norway with a Knapsack,' I could only find two boats and about half-a-dozen specimens of their inhabitants, and these rather dirtier than the average.

We called on Mr. Consul Robertson, at his new house—quite an Arctic mansion. I felt bound to do this for *auld lang syne*, although I had already learned that the old custom of calling upon the consul, which in 1856 was a matter of almost necessary courtesy, has now become more honoured in the breach than the observance, as the number of tourists, even here at the *ultima thule* of British consulship, renders it at present a bore and a serious tax upon the time of Her Majesty's representative.

Mr. Robertson told us that the Lapps only visit Hammerfest occasionally to sell their fish, and then leave for the sea; that they are losing their primitive habits, and becoming more like the Norwegians. He expects that they will amalgamate, and die out in the course of a generation or two. He also stated that reindeer are rapidly diminishing in numbers, so much so, that he and others living thereabouts fall short of their customary winter supplies of meat. On this point Mr. Robertson may have been mistaken, as he failed to take into account the great increase of Norwegian population, not merely at the town of Tromsø, and the whole of the Tromsø *amt*, or district, but also in the Finmarken's *amt*, in which Hammerfest is situated, where the population has grown from 8320 in 1825, when Mr. Robertson first settled there, to 22,145 in 1870: Norwegians 8585, Lapps 7183, and Quains 4566. The increase of demand consequent upon this explains a scarcity of venison, without assuming any diminution of the number of deer.

Mr. Robertson, who has lived fifty years at Hammerfest, tells us that this is the worst summer The North Cape in Winter he has known. The Duke of Roxburgh said the same concerning his sixteen years' experience.

July 20-27th.—Leave Hammerfest at midnight, and reach the North Cape at 7 a.m. It is a magnificent rugged headland, nearly 1000 feet high (976 Norsk feet. A Norsk foot = 1.029 English). The weathering of the rock face clearly indicates a tendency to pyramidal lamination, and several pointed crags stand out boldly on its western side. The summit of the rock is nevertheless so completely glacier-planed, that, as seen from the packet, it has the appearance of a smooth lawnlike greensward.

This is well shown in the engraving opposite, which is a winter picture of the North Cape seen from a

considerable distance. The snow covering displays the flat surface very distinctly. It is drawn by a French artist without any reference to glacial or any other theory in explanation of this characteristic table-top. The hollows or ledges on which rest the curved patches of snow are probably the channels by which the ice flowed, or bent over the edge of the precipice. They represent in miniature the greater hollows or scooped troughs that flank this and the other headlands. This is especially the case with the larger snow-filled hollow behind. We stop nearly an hour within a few hundred yards of the precipice, and some of the passengers amuse themselves by catching codfish. With only three lines of the kind already described, without bait, the deck was speedily covered with fish of 10 to 15 lbs. weight, among which were a few halibut. The water was deep, but the plummet had only to be sunk to the bottom and a few jerks made, when a fish was hooked, demanding some effort to haul it over the bulwark.

The North Cape is usually described as the northernmost extremity of Europe: this is not quite correct. There is a low glaciated tongue of rock, called *Knivskjierodden* or *Knivskjoelodde*, about a mile to westward of North Cape, which projects farther north than the cape itself.

Immediately to the east of the cape is a fine amphitheatre of rocks, partly surrounding a curious plain like the pit of a theatre. This appears to have been the bed of an ancient glacier which has poured over the rocks beyond, and has moved from the south, northwards.

Some of our passengers, Germans and Belgians, land at Kjelvik, in order to explore the island Magerö, and to climb the North Cape. From Kjelvik, where there is a wooden church and several buildings, the cape may be reached by an overland journey of about twelve miles.

We call at several of these lonely settlements or stations, and reach Kepvaag, the largest, at 1 p.m., then steam onward up the Porsangerfjord. The rocks are curiously weathered hereabout, especially near Kepvaag. As we proceed up the fjord, the craggy precipitous promontories disappear, and low glaciated islands and rounded hills of moderate elevation prevail. At Kistrand, where there is a church and parsonage, the ancient glacier bed forms a cultivated grassy slope, on which some actual farming is done. I have little doubt that this deep and wide fjord was once filled by a great glacier which poured down from the south. The high table-land above the fjord, especially the promontory separating it from the Laxefjord, everywhere displays the same lawn-like effect of glacier planing as the surface of Magerö above the North Cape.

The north headland of this promontory of Spirte Njarga, Sverholtklubben, is a huge precipitous rock like the North Cape, but still finer, more wild and jagged. The Fuglebjerg, forming a part of this promontory, presents one of the most wonderful displays of animal life to be seen in any part of the world. The rock weathers perpendicularly and forms a series of ledges in regular tiers, like a gigantic staircase rising from the sea to the summit of the precipice, which is above 1000 feet high. On these ledges, which extend along the face of the rock for more than a mile, and are about two or three feet apart, are perched hundreds of thousands of sea birds, all squatting side by side, and equidistant from each other, about eight or ten inches apart, in horizontal rows, their white breasts contrasting strongly with the black rock behind. The regularity of their arrangement on the ledges is very grotesque. They appear like an audience of a million or two of male pigmies in evening dress—all shirt-front—occupying accurately measured seats all “numbered and strictly reserved.” They are for the most part a species of gull, the kittiwake.

On blowing the steam whistle, a roar of wings is heard, mingled with harsh, wailing screams, and a huge cloud rises from the face of the rock and darkens the sky. I have seen great clouds of sea birds on the coast of Scotland, but nothing approaching to this astounding multitude. I dare not estimate their numbers, not having any means of estimating the area of the living cloud, and the number of strata composing it, nor any experience of the appearance which a million or two of such, rapidly moving living things would present. The sight was worth a special journey to behold.

The comfortable existence of such a huge city of voracious gulls shows how abundantly these Arctic seas must be supplied with fish. Our fishing lines were thrown out at every station, and never failed to keep the anglers hard at work in hauling up struggling codfish.

About fifty millions of codfish are annually taken by the Norwegians for exportation, besides those used for home consumption, and the vast numbers that are caught by foreigners. The Russians take a great many. During a short stay at Boulogne I saw five vessels, each with a crew of about twenty men, return from the Arctic cod-fishery. Quite a fleet of such vessels sails annually from Dunquerque and other ports on the French coast, returning, after about six months' absence, loaded with salt codfish. I went on board of some of these French Arctic fishing boats, and found on the bulwarks the guides or pulleys for jerking the lines, and learned that, like the Norwegians and Lapps, they hook the fish in the manner already described. All these millions of fish are thus caught singly. The herring fishery (with nets, of course) is of similar magnitude, but is declining.

We were told that the inhabitants settled in the little bay forming the Sverholt station derive their chief subsistence by collecting the eggs of the gulls, which they do very carefully to avoid disturbing them.

The Laxefjord is glaciated in the same manner as the Porsangerfjord.

July 28th.—The sun is vexatiously coy at midnight, although visible just before and after. This is due to a bank of mist that hangs pertinaciously on the north horizon, and which I suspect marks the meeting place of the warm Gulf Stream (I use the old name, although it is temporarily out of fashion) with the ice-cooled waters of the Arctic Ocean.

We pass several more magnificent headlands after leaving the Laxefjord, some of them displaying so slaty a fracture that I suspect they may have considerable value as quarries that might be worked close to the sea, an advantage that would compensate for their geographical distance. Many of them are wilder and grander than the North Cape, to which most of them bear a great resemblance. This is the case with *Nordkyn*, which is the northernmost limit of the *continent* of Europe, the North Cape and Knivskjierodden being on the island of Magerö. The second headland east of Nordkyn is one of the finest. The perpendicular cleavage of these rocks and the pyramidal spikes of slaty crags that stand forward upon the face of the precipices greatly add to their grandeur and general effect. All are topped with the same level plateau as that of the North Cape, and flanked by long troughs or outspreading hollows, sloping towards the sea and obviously glaciated. Some of these smoothly curved trough-shaped valleys have level barriers across them near to the sea. I should like to have landed and examined these, in order to learn whether they resemble the plains of till at Bodö, but had no opportunity of doing so.

One of the regular "lions" of this coast is the "Finkirker," a curiously shaped rock, projecting and nearly isolated from the headland of Kjöllefjord. It has the appearance of a castle or cathedral with square towers. This rock is said to have been formerly worshipped by the heathen Lapps. There are some remarkable chasms to the west of the Finkirker, and altogether the headland and entrance of the Kjöllefjord are very magnificent. The tearing action of the waves is shown most strikingly hereabouts, but it has not brought down sufficient of the rock to raise a beach upon which the waves can roll. All these tall dark cliffs plunge directly down into a deep and still darker sea. At 5 p.m. we reach *Vardö*, a town of some importance in these latitudes. It is on an island of the same name, and has about 1200 inhabitants. The chief occupation of these people is plainly indicated by the market gardens which cover a large area surrounding the town, and constitute a characteristic feature of its suburban scenery. These market gardens of the Arctic regions are very different from those of the temperate zones, their produce being "*stokfisk*" or stockfish, i. e. codfish, which are dried in the sun by hanging them in pairs across long sticks (*stok* is the Norsk for a stick), which sticks are supported horizontally on frames. Where there is no soil into which the supports for the frames can be thrust, as on the Lofodens, the fish are dried by spreading them out on the bare rocks. These are called "*klipfisk*," from *klippe*, a rock.

After drying, they are stored in wooden buildings, that constitute a prominent feature of all the Arctic towns and stations of the coast. They correspond to the "storhaus" of the Norwegian farmer, are built close to the water's edge, some on piles and with a wooden platform or pier in front, from which the dried fish are shipped on board the "yachts" or local coasting craft which carry them to Bergen, where they are reshipped for the Mediterranean

and other parts of southern Europe. It should be understood that the agriculture of the glacier farms which I have described is merely a supplementary source of subsistence to the hardy Arctic Norsemen. A little grass, some potatoes, and in favoured spots a patch or two of oats or rye, is all the harvest of the land. That of the sea is abundant, and affords employment and subsistence to upwards of 160,000 persons. The value of the fish exported amounts to about 2,250,000*l.* annually.

VARDÖ.

Two of the storehouses for fish and oil, with their platforms in front, are shown on the right-hand side of the above engraving of the port of Vardö. The suburban market gardens are not visible from this point of view. The boats with masts are the fishing boats, of which between four and five thousand are employed; the largest are of only three tons burden. They all have the high bows and sterns here shown, and they slope outwards considerably at the bulwarks. They are thus enabled to jump over the short chopping seas to which they are so much exposed, and which would otherwise fill and swamp them.

The yachts, shown opposite, are sturdy broad-beamed thick-timbered vessels of larger dimensions, with a massive mainmast and huge mainsail stayed to a broad and lofty prow. They are curiously antique-looking and picturesque, especially when a fleet of them is seen sailing southwards, with their decks piled up with stacks of dried fish ten or twelve feet high, in defiance of Plimsoll. The ships of the Vikings were such as these.

Vardö is unusually distinguished by the possession of a fort, the fortress of *Vardöhus*, the northernmost fortress in the world. It is falling rapidly into decay, and the Norwegians are too practical a people to waste their resources by keeping it in repair, or otherwise building forts to-day which the progress of artillery will render useless to-morrow. It is true that Russia is very near, but it is also true that if Russia should at any time determine to attack Norway, she is not likely to be either frightened away or driven away by any forts that may be erected on the Arctic Ocean.

During the last twenty-five years we, in England, have spent about five hundred millions in defensive armaments. Let us suppose that instead of doing this we had only spent half the amount, and set the other two hundred and fifty millions aside as a reserve *war fund*. With the compound interest, this would now amount to nearly four hundred millions. The possession of such a fund, ready to hand for fighting purposes whenever needed, would do more to frighten the Russian bear and every other bugbear, than the biggest fleet of ironclads, or any other armaments we can possibly maintain, over and above the modest army and navy, &c., that might have been kept up for the other two hundred and fifty millions which I suppose to have remained for immediate defensive expenditure.

After visiting the fortress and the stokfisk drying grounds, we make an excursion to an island lying to the north-east of the town, which, from a distance, appears to be lightly sprinkled with snow. On reaching it we find that this is due to the white blossoms of the moltebeer growing in wild luxuriance on the mossy floor of the island, which is kept as a reserve for this fruit, and also as a breeding place for the eider-duck.

Strict regulations are enforced to prevent these interesting animals from being disturbed, but we were allowed to visit the island with a guide, and further permitted to see one of the nests with the eggs in it. I was surprised at the quantity of down that forms a single nest. It measured more than a foot across, or if spread out, the down would form a mat of above fifteen inches square, i. e. 225 square inches, and when uncompressed, nearly two inches thick. I should estimate the whole at about 400 cubic inches of down in its natural loose state, compressible of course to a very much smaller bulk. It is dark grey with very little admixture of foreign matter. The eggs are about the size of our domestic duck eggs, green, or greenish blue, with black spots. The duck was so tame that she returned to her nest after the boy replaced it on its ledge of rock.

Scurvy grass grows very luxuriantly on this island, around Vardö, and on its house roofs. The moltebeer and scurvy grass have done good service in these latitudes, where the scarcity of succulent vegetable food renders their inhabitants so liable to scurvy and the allied diseases that are promoted by deficiency of potash and other

alkaline salts in the blood.

July 29th.—Leave Vardö as usual at midnight, and arrive at Vadsö in the Varangerfjord at about 4 a.m.

This fjord is not remarkable for its scenery, but its political relations are peculiarly interesting. We are accustomed to regard Russian diplomacy as wonderfully acute, far-seeing, and aggressive. This opinion is by no means verified by the negotiations which determined the last rectification of the frontier line between Arctic Russia and Arctic Norway. This line follows the Tana river from the wild region of its sources down to Polmak, where the river begins to widen to an estuary; so far the line runs nearly from south to north. At Polmak it makes a sudden bend of about a right angle, and then passes to the east and south-east, i. e. nearly parallel to the south bank of the Varangerfjord, but within a respectful distance from the salt water. It then bends round again, still avoiding the southern arm of the fjord, the “Sud Varanger,” and finally turns up to the Arctic Ocean. Had it continued straight on at Polmak, only fifteen miles farther, it would have given to Russia the southern side of the Varangerfjord. Had it followed the Tana river to its mouth, it would have taken in both banks, i. e. the whole of the Varangerfjord, and the small peninsula lying between the Tana and the Varanger fjords.

That the second should not have been conceded is obvious enough, as it would have sacrificed Vardö and its peninsula; but as a mere matter of territory, the little strip between the Russian frontier and the Varangerfjord would be a trivial matter to Norway, as it is pitifully unproductive, its total agricultural value being less than the ground rent of a Cheapside warehouse. Of what use then can be this insignificant strip to Russia? the reader may ask. It would simply supply her with that which she is said to covet so eagerly in order to become a great naval power; a safe harbour and naval depôt open to all parts of the world at all seasons of the year. The Varangerfjord receives the final eastward wash of the Gulf Stream. It remains open during even the severest winters. It is an estuary and natural harbour, about fifty miles long, ten miles wide at its mouth, and gradually narrowing. All the navies of the world, ten times told, could ride in safety within it, and it could be fortified with the greatest facility.

To the east of this, i. e. within the Russian frontier, there is the White Sea, and that portion of the Arctic Ocean which is commonly inaccessible during severe winters, on account of its frozen shores; and therefore as worthless to a naval power as the Baltic and the Gulf of Bothnia.

Thus the boundary of Northern Russia corresponds to the limit of the Gulf Stream, and, by what some may regard as a political providence, Russia is kept on the wrong side of this beneficent current.

I was naturally desirous of seeing this inlet, that may yet become historical. The Norwegians to whom I have spoken care but little about it. I suspect that Russian diplomatists are fully aware of this, and therefore are not likely to pick a quarrel for the sake of that which they may at any time obtain by exchange of territory or other moderate consideration. It may, however, be supposed that the jealousy of the other European powers would throw obstacles in the way of any arrangement with Norway which would open all the world to the fleets of Russia. We Englishmen are supposed by most of our continental neighbours to be especially tainted with such jealousy, but in this, as in so many other matters, they greatly misunderstand us. If Russian statesmen would “turn over a new leaf,” would obey the tenth commandment, and treat their eastern and southern neighbours with some approach to honesty; if they would disband at once and for ever the infernal machinery by which they manufacture Bulgarian atrocities, Servian insurrections, and other international abominations, we Englishmen would be the first in the world to welcome every step they could possibly make in the development of the vast resources of the magnificent empire of the Czars.

It cannot be to our interests that commercial Russia should be shut out from the sea. We are profoundly concerned in her legitimate prosperity, inasmuch as she offers us eighty millions of customers, whose transactions must of necessity be measured by the magnitude of their own resources.

We all understand this, being “a nation of shopkeepers;” but we keep consciences as well as shops, a combination more compatible than flippant cynics commonly suppose. Hence it is that the moral sense of the British nation is

outraged, and its indignation violently roused by the spectacle of a hypocritical invasion of a neighbour's territory. This feeling is totally different from international jealousy. Diplomacy, having no conscience, is incapable of interpreting public opinion based on conscience. To the cool diplomatic reasoners who have frozen up their own moral sympathies, our contradictory proceedings, when we hold meetings, spout red-hot speeches, pass strong resolutions, and *after all this*, begin to investigate the subject, and then act rationally, is utterly paradoxical and inscrutable. The key to it all is that we are an intensely sentimental people, our feelings are aroused more readily than our intellect is awakened; hence we first protest, then think, and finally act; and if it happens that we were misinformed during the protesting stage, our action and our protests may directly contradict each other, to the utter discomfiture of the cunning statesmen who have expended large amounts of secret service money for the purpose of fooling us, and who, depending on our first outbreaks of sentimental extravagance, imagine that they have succeeded.

But to return to the particular case that suggested these general reflections; I am quite certain that a rectification of the present absurd boundary between Russia and Norway would give no offence to any influential section of Englishmen, provided it were done by means of an open and honourable negotiation, affording to Norway a fair and full equivalent to the concession she would be called upon to make. The natives of Vadsö and the owners of the surrounding rocks would gain largely by the establishment of a Russian naval and commercial station in the Varangerfjord, and Great Britain, as a whole, would welcome this and every other movement that Russia might make in the extension of its commercial, manufacturing, and agricultural prosperity, in accordance with a distinct understanding that the age of Cæsarism and every other form of military brigandage has passed away, and that any nation that strives to revive it becomes the enemy of the whole civilized world, and will be prosecuted and punished accordingly.

The Vadsöites at present appear to be on very good terms with the Russians. Most of the ships now in the harbour are Russian vessels, and I see a great many Russian sailors making purchases at the shops. They are evidently good customers, and therefore well beloved.

Vadsö is thriving and growing. It has now a population of about two thousand. The following letter, which I wrote on the spot and posted to England, describes the town and its chief industries:

"I am writing this letter by the light of the midnight sun, which has just made his last appearance for the present season. Everybody is wide awake, shops and offices are still open, and business hours continue irregularly until about 2 a.m. The sun has been continuously above the horizon for more than two months, during which period bedtime is at any time or no time, as may be found convenient. The steam whistle of the screw steam-packet omnibus, the 'Haakon Adelstein,' is screaming for the third time, to finally warn the wakeful population of Vadsö that she is about to weigh anchor and depart by way of the North Cape, Hammerfest, &c., to the south. I will go on board and tell you what I see.

"A great salt-water channel, which, being nearly land-locked by promontories and the island of Vadsö, appears like a salt-water lake. The boundaries are humpy rocks, which once were mountains of similar geological formation to those in Wales between Snowdon and Bangor; but here they have been planed down to their present hogback shape by huge glaciers that formerly swept over them." Just where the channel between the island and the mainland is the narrowest—i. e. about half a mile wide—is an irregular collection of wooden houses, with sides painted white or red, and with bright green roofs. The roofs, however, are not *painted* green; but their colour is due to a rich crop of grass covering every one, and variegated with large buttercups and the white flowers of the winter green and scurvy grass. A couple of goats are grazing on one of the roofs, and the others will shortly be economized in like manner, or carefully mown before the winter darkness becomes complete. With the exception of this roof-crop, the houses are exactly like those of the wooden villages sold in chip boxes at the toy shops. The church at Vadsö, like other Arctic churches, is of the toy-box order of architecture.

"Everywhere between the houses, and extending far beyond the houses, are dozens and scores of acres covered with a curious network of low wooden scaffolding, which 'no fellow can understand' at first sight, and from a

distance. Close inspection reveals a continuous repetition of wooden framework, upon which, at a height of about six feet from the ground, are laid horizontal wooden bars or sticks, the trunks of young pines or fir trees. These skeleton structures are not unlike Italian vineyards, but the fruit is very different. Instead of the twining stems, the elegant vine leaves, and sweet bunches clinging by delicate tendrils to their supports, we here find the rich and odorous harvest of the Arctic seas, split codfish, hanging in pairs by the strings which hold their tails together. These are the 'stokfisk,' or stockfish, of which so many millions are annually exported to Italy, Spain, and other Catholic countries, for consumption on fast days.

"Near to these are other curious objects; the sense of sight is not needed in seeking them. If you obey the popular injunction and 'follow your nose' in the direction of steadily increasing odour, your nose will unerringly lead you to some huge vats, where the livers of codfish are straining and stinking, and rendering the cold-drawn oil; or to caldrons, where the residual oil is being extracted by a process which can scarcely be called frying, but exceeds the energy of stewing. Although it may not bear the name of either, it emits the odour of both.

"The oil season is now nearly over, and very little oil is being extracted; but this little is quite enough for untrained olfactories. Two qualities of oil are made, viz. 'medicine oil,' carefully extracted from the best and freshest of the livers, and a far larger quantity of what is known in the market as '*fish oil*,' prepared rudely during the pressure of the busiest of the fishing season from livers that have been neglected, mixed with other offal, and more or less putrescent. This is chiefly used for leather dressing.

"Under and around the stok frames the ground is more or less thickly bestrewn with cods' heads, also drying and also stinking. Formerly, these were thrown into the sea, but now they have become an important source of wealth, for the onward march of chemical science has taught the Norwegian fisherman that the phosphate of lime of the cod skulls, and the ammoniacal compounds of their integuments, have great value as a portable manure. Hence the introduction of a new industry, the manufacture of '*fisk guano*.' Many cargoes of these dried skulls are sent to Leith, where, as I am informed by the Norwegians, there is a prosperous manufactory of fish guano. There is a '*guano verk*' at Vadsö. It is the biggest of all the wooden buildings of the town. Also one at Hammerfest, and another in the Lofodens.

"The manager of the latter is on board, and has shown me a sample, which is nearly white, and like coarse meal. It has very little odour. From its composition and taste (I had sufficient courage to taste it myself), I believe that it may be used more profitably than for manure, by mixing it with meal, and adding this mixture to the ordinary food of domestic fowls. When laying they require more phosphates than mere grain affords, especially if in confinement. My own fowls are always supplied with the fish bones from our own table; they eat them with great avidity, and give them back with good profit in the form of increased production of eggs. The cods' heads being ground, would supply this kind of food in a very convenient form.

"But stokfisk, cod-liver oil, and fish guano are not the only harvests of the sea that are reaped by the Vadsöites. They get these in common with the rest of their Arctic neighbours, and, in addition, have recently instituted a special industry of their own. An enterprising Norwegian, Mr. Sven Foyn, has successfully carried out a method of whale fishing which has greatly added to the prosperity and the stench of Vadsö. He has two steamers, with hull, masts, and all other visible parts painted sea-green, in order that they may approach their victims unperceived. They are armed with small swivel guns, weighing about 3 cwt., at the bow. From these is fired a compound projectile, consisting of a harpoon with hinged barbs, or rather flukes, like those of an anchor, and weighing altogether about 30 lbs. While the harpoon is in the gun, going through the air, and piercing its victim, these arms, or barbs, or flukes, lie snugly down by the side of the harpoon shaft, but when it has penetrated the flesh of the whale, and the shaft is drawn backwards, they spread out, pierce the flesh sideways and obliquely, till, at an angle of about 45°, the stop of the hinge checks their further outspreading, and they become an effectual barb, which renders the withdrawal of the harpoon impossible. But this is not all. Besides this formidable hinged barb, the harpoon is furnished with a humanely devised explosive shell, which bursts within the solid flesh of the sea monster, and kills him almost instantaneously. A towing cable is then fixed to his

capacious nose, and the little bright-green steamboat tugs the great slate-coloured carcass into the Vadsö harbour.

“One of these was thus brought in about twenty-four hours ago, and another followed in the afternoon. My pupils and I have just returned from a rowing excursion round the carcass of the latter, which at a distance looks like one of the low rounded island rocks that abound hereabouts; and might be mistaken for one, but for a curious flat angular peak that stands above the water a few yards beyond. This is one lobe of the dead creature’s tail. The island is his back. His head, with huge open mouth, which appears large enough to swallow himself, This paradox is not so impossible as may appear. Some fishes have mouths quite large enough to include themselves. I have proved this by taking two John-Dorys of equal size and putting each into the mouth of the other. Please to note my exact words. I say “*each*” not *both* into the mouth of the other, i. e. the two operations were separately performed. is lying deep under water. The nose-cable is already attached to a windlass on shore, fixed at the top of a sloping wooden landing-place or whale pier. On this huge slab the remains of the whale that came in last midnight are still lying—a loathsome mountain of pinkish beefy flesh, into the midst of which half a dozen of hideously blood-stained men are chopping and hacking with great hatchets and long-handled, big-bladed weapons, like inverted scythes or large bill-hooks. Some are peeling off the blubber that surrounds the whole carcass, and serves, during the life of the animal, to protect its warm blood from the deadly chilling of the Arctic water. Others are hacking at the already peeled portion of the flesh mountain, and thus detaching great slabs that slide down the sloping whale-pier into the sea, to float and stink until further orders are received concerning their disposal. In the course of this carving process, the operator has to bury himself in the chasm he has cut, in order to complete the separation of each lump. The condition of the man after thus diving and slashing into the midst of this gory filth may be better imagined than described!

“I visited these operators about twelve hours ago, intending to watch the whole of their proceedings, but was ignominiously vanquished—forced to precipitate flight. On entering the little bay or cove, at the bottom of which the whale pier is built, the water was so deeply reddened by the drainage from the present and past carcasses, that we seemed to be rowing in blood. We had to push the boat between floating putrescent islands that had been launched and left there from the previous cuttings-up; and a hideous heap of coiled entrails, recently dragged by a winch from the belly of the beast before us, was piled up at the water’s edge, forming an appropriate headland, against which the slimy, gory waves were breaking. We landed upon a slippery causeway, varnished with a coating of putrescent blood and mucus.

“I have breathed large volumes of sulphuretted hydrogen, can stand the worst sights and smells of the dissecting room, have assisted in the disinfecting of town sewage, and never was beaten before; but this whale butchery and its inconceivable stench produced such irrepressible vomiting that I was compelled to run at full speed up the nearest hill-slope, or should have fallen in fainting helplessness into the midst of the surrounding horrors. My humiliation was rendered the more crushing by the ladies remaining behind after I had fled. They had smelling bottles; I had none. The stink was of an exquisitely sickening character. There may be stronger stinks in some corners of the universe, but an honest ordinary stink has usually some degree of ammoniacal or sulphurous pungency of stimulating property; here there was none. The ammoniacal vapours were all saponified by the blubbery exhalations, and slimy, greasy, oleaginous, mucoid rottenness alone remained. The survival of the men who were slashing at the dreadful mass, and partly buried within it—one emerging just as we landed—was the most surprising of all. If Dante could have visited Vadsö this morning, he would add another chapter to his ‘Inferno,’ presenting the souls of the wickedest of wicked sinners suffering the final climax of damnation by eternally peeling blubber from putrid whales, and carving the carcass into lumps for the manufacture of guano. “It is evident that the whale butchery of Vadsö is just now at its worst, the whale at present floating being the thirty-eighth taken this summer within little more than a month. The steamers go out for five or ten hours, and come back with a carcass, and thus new mountains of flesh are hauled upon the great slab before the fragments of the last can be worked off to their final destination. One of the great features of this Vadsö whale fishery is the economic utilization of the whole animal. The Greenland fishers pitch the flesh, entrails, &c., into the open sea, using only the blubber and bone; but here the whole remaining bulk of the monstrous beast is converted into

‘waal-fisk-guano.’ Just now, the guano verk cannot overtake the supply of flesh, and thus so many tons are floating or stranded, and rotting in the continuous sunlight of the Arctic summer.

“I have examined some samples of this guano. It is a much darker powder than the cods’-head guano, has an offensive odour, and is quite unfit for any feeding purposes, but is doubtless a valuable manure.

“The Norwegian whale fishery is likely to extend beyond Vadsö, and become a serious rival to that of Greenland, unless the facilities afforded by the harpoon guns exterminate the whales. The advantage of bringing the whales ashore, and utilizing the whole mass, considerably diminishes the prime cost of the oil and whalebone. Whales are more numerous hereabouts than I supposed. About a dozen large whales have passed within catching distance of the steampackets in which I have journeyed during the last month, and small whales are much more abundant in the fjords, where the Norwegians will not allow them to be disturbed, as they are supposed to drive the herrings inwards and prevent their too speedy return to the sea. There appears to be good foundation for this belief, and this restriction of the whale fishery may preserve the young whales from the ruinous extermination that otherwise would occur.

“The outer film of the skin of the whale is not yet utilized. It separates very easily. We stripped off considerable sheets of it from the back of the floating carcass. It is about as thin as Bank of England note paper, nearly transparent, waterproof, strong, and inoffensive. The whale from which we stripped our samples was estimated to be about twelve years old. The skin from younger whales is better. A sample I have seen from a three-year-old is wonderfully strong, and may be useful for surgical bandages, &c.”

The engraving represents a portion of the slab and of a carcass in the course of its first and least offensive stage of blubber peeling. The blubber is cut off in square slabs, for which purpose the surface has to be lined by the same devices as a gardener adopts in laying out flower-beds. The man holding the rope is guiding the cutter, who follows him. The heap in the background is a collection of odorous lumps from a previous carcass, awaiting their turn at the guano verk. There is no room for the tail in this edition. Blubber Peeling.

CHAPTER VII.

The northern face of Europe — Its conformation contradicts the hypothesis of a radial glaciation of Europe from the Pole southwards — Arctic musquitoes — An explanation of their abundance — Suggestions for the economic building of summer excursion steampackets — Hammerfest again — Lapp courtship — Winter quarters of the fisher Lapps — A German Mars and a Lappish Venus — Intermingling of Lapps and Norwegians — Coast glaciers — Tromsö again — Destruction of the Hôtel du Nord — Our embassy to the camp of the Laplanders — Successful negotiations for a special reindeer gathering and performance — We revisit the camp — Sleeping beauties — Astonishing an old friend — Primitive machinery for spinning reindeer tendons — We breakfast *en famille* in the Lapp hut — Driving the deer — Illusions relative to reindeer — Lassoing, punching, and milking the deer — A beautiful Lapp baby — The origin of the physical hardihood of the Lapps — Social status of Lapp women.

We return to Hammerfest by the same route, admiring again the craggy precipices of the majestic headlands that form the characteristic feature of the northern face of Europe, and stand like giant sentinels guarding its outposts against the billowy charges of the Arctic Ocean. The general aspect of this coast refutes the idea, expounded by some geologists, though by no means generally received, that, during the great ice age, a great ice sheet proceeded radially from the north polar regions, and overswept Scandinavia and the rest of northern Europe. The craggy headlands and the structure of the intermediate slopes all indicate that the ice sheet moved in the contrary direction hereabouts, viz. from south to north. The table-tops of the North Cape, Nordkyn, and the rest of these promontories are all smooth planed and rounded over, or sloped down at the edge of the precipice and a little farther back. During the time of greatest glaciation they probably presented the same appearance as now

displayed by the glacier cornices at the precipitous terminations of the Jostedal Sneefond, which I have described in chapter xii. of 'Through Norway with a Knapsack.' The characteristic rounding down of the edge of these headlands was probably produced by the bending over of these glacier cornices previous to their breaking off and dropping into the sea, or on to the ice-foot below.

The whole of this Arctic face of Europe is a glacial "*leeseite*," not a "*stosseite*;" it is the side from which the ice-flow came, not that towards which it was thrust.

The terraced weathering of the rocks forming the shelves upon which the sea birds reside is shown in the annexed engraving, which represents one of the lower headlands of the Laxefjord, near to Sverholtklubben, on which the Terraced weathering in the Laxefjord. characteristic staircase formation is somewhat exaggerated by exceptionally prominent development on this particular promontory.

It may be fairly asked whether this weathering has produced the precipitous character of the great headlands since the glacial epoch. If so, the argument which they afford against the hypothesis of a great radial outspreading *mer de glace* from the pole southwards falls to the ground. It may be argued that the Arctic shore of Europe was originally planed down as a northward slope to the sea, but the waves have battered and undermined the sloping promontories and left perpendicular faces standing like our chalk cliffs, which certainly have been formed in this manner by the waves.

A reply to this is presented, first, by the hardness of the rocks themselves; and, secondly, by the absence of a sea beach such as would be formed by the material washed down by the waves, had they done the great amount of work necessary for the conversion of glaciated slopes into precipices rising above 1000 feet out of the water. It is only by undermining that the waves can cause such precipitous faces, and the material that would drop down from above must make a great heap at the foot of each cliff. This heap, when formed of such hard material as these, would resist the further action of the waves for ages. In the case of our chalk cliffs, the soft material of the landslips is soon washed away, leaving only the chalk flints that form our pebble beaches. Even these, small as is their bulk in proportion to that of the whole mass of the chalk, have considerable effect as a barrier to the further encroachments of the waves.

I availed myself of the opportunities afforded by our halts at the stations to use the lead at the end of the fishing lines for the purpose of feeling the bottom. This I could do by dropping it down rather heavily without quite slackening the line. By this means I ascertained that the bottom was not made up of fragments of hard rock, but of softer material; and the stains or smearings upon the bottom of the lead indicated, though not clearly enough to *prove*, that the bottom was composed of till, like the banks at the bottom of the Tromsösund, on which we caught the small codfish and haddocks.

It should be noted that the cod fisheries of the Norwegian coast, and of the coasts of Iceland and Newfoundland, are upon what the fishermen call "banks," such as the "Doggerbank," the "Lofoten bank," the "Storeggen bank," &c. See foot-note, p. 229.

Banks of this kind abound hereabouts, and they appear to be especially prolific just opposite to Sverholtklubben, where the great confluent glaciers of the Porsangerfjord and Laxefjord have poured their ice torrents into the sea. The bearing of this upon my theory of the origin of the till will presently be seen.

These prolific banks, and the convenient staircase structure of the rocks, have doubtless combined to determine the location of the marvellous colony of sea birds at Sverholtklubben.

Even here, at the outermost Arctic limits of Europe, that purest manifestation of true artistic taste—the love of beautiful flowers—was charmingly displayed, for amid all the stinks of codfish, oil cauldrons, and whales, there were choice flowers blooming brightly in the windows of Hammerfest, Vadsö, Vardö, &c.; and at the most dreary northern stations we continually picked up passengers carrying flowerpots in which were growing choice exotics, evidently tended with the greatest care. They were nursed like babies during the voyage, and most tenderly handed over to the boats by which the passengers landed.

We saw several boats of the fisher Lapps opposite the mouths of the Porsanger and Laxe fjords, and also of the Tana and Varanger fjords.

These hardy people seem to be increasing in numbers, while the Fjeld Lapps are declining. Their harvest is practically inexhaustible, and judging by the results of our fishing hereabouts, it is easily reaped. Their boats are similar to those shown on p. 115.

The capital they require is much smaller than that demanded for the subsistence of the Fjeld Lapp. Two or three hundred reindeer are necessary for the support of a single family, and the money value of these amounts to 400*l.* or 500*l.* The fisher Lapp only needs a boat and lines. The boats are built very cheaply here, and he requires no expensive nets, as for herring fishing.

Fisher Lapps (from a photograph). The steam whistle was blown again at Sverholtklubben, and the sky was darkened as before. This second display appeared even more wondrous than the first, and exalted our first impressions of the vastness of the living multitude.

At Kistrand we pick up some of our fellow passengers, who had made an excursion to Magero from Hammerfest; twelve hours in a boat, and fourteen hours on horseback. They obtained better food and sleeping quarters than they expected to find, but were intolerably tortured by mosquitoes. They told us that during one portion of their horse journey the cloud around their heads was so thick that they “inhaled” mosquitoes, and had to spit them out of their mouths. One of the Germans, a sturdy veteran Uhlan officer, accustomed to the roughest of rough riding, especially during the French war, was unhorsed by these small creatures; i. e. in struggling against them he fell from his horse and sprained his hand rather severely.

We were teased by them even on board the packet, which they invaded at every station where we halted, but they were blown away when we steamed out to sea again. Why are mosquitoes so abundant in these latitudes? This question puzzled me for a long time as it has puzzled others, but I think I have at last discovered the answer. There are no swallows here. Gnats of all kinds pass the early and longest period of their lives in water; first as wriggling, red-jointed worms, next as jerking, big-headed, bristly, tubular-tailed larvae, under the skin of which the winged climax is gradually elaborated; and from which skin, while floating on the surface of its cradle-pool, it skilfully hatches and extricates itself in the summer time. In England and other countries, where human existence is not seriously impeded by mosquitoes, swallows may be seen skimming the surface of ponds and pools and swampy places where gnats are hatching and newly fledged; the snapping of the swallows' beaks tells of the multitudes they devour.

When the air is clear and dry the gnats are able to soar to considerable heights; when it is damp and clammy their wings are clogged, and they can scarcely raise themselves above the surface of the ground. The swallows follow them in either case, and hence the well-known prognostics of the weather based upon high flying or low flying of the swallow. The presence or absence of these birds must have preponderating influence on the prevalence of mosquitoes, and I suspect that to the absence of swallows in Arctic Norway we must mainly attribute the unchecked multiplication of these pestilential little beasts. Until somebody invents a substitute for swallows, inland excursions hereabouts, however interesting otherwise, cannot be made enjoyable.

Reach Hammerfest on 1st August in a state of mild fever, from want of sleep. The *Haakon Adelstein*, although newly built at Newcastle, is constructed on a very bad principle. In order to exaggerate the dimensions and appearance of the saloon, the sleeping place for the male passengers is a black bole under the saloon, 24 feet by 18, and 6½ feet high, with about twenty berths, and its floor 3 or 4 feet below the water line. The only practically available ventilation is by a nine-inch brass pipe, which passes through the saloon and opens trumpet-mouthed on deck. There are ports over the upper berths, but these cannot be opened as the sea splashes into them. Some American passengers and myself had quite a contest respecting these ports, which we surreptitiously opened, and thereby partially inundated the cabin. They were then forcibly screwed up, and the air was so bad that every night, after about two hours' feverish sleep, I was compelled to go on deck. The continuous daylight

of course increased the difficulty of sleeping, and therefore I was very glad to spend six or seven hours of our sojourn at Hammerfest on sleeping soundly in bed at the hotel there. It is possible that my sensations of the bad ventilation of the sleeping cabin were exaggerated by the fact that I left England in a very questionable state of health; a long account of anxiety and overwork was debited against me, the inevitable settlement was fast approaching, and was only just met, and sanitary bankruptcy averted by this excursion, during the whole of which the equilibrium of my nervous system was much disturbed; this may have reached its climax when I awoke every morning with a morbid dread of actual suffocation, which I knew to be unfounded, and yet could not control.

The ladies had a fairly ventilated cabin level with the saloon, but it was much crowded. This is an inconvenience necessarily incident to so large a party of ladies. The addition of six to the usually full numbers that occupy the ladies' cabins at this season, is a serious overflow, and cannot fail to produce discomfort.

There are three or four deck cabins on this vessel, but they were appropriated by the married people, or those that had come from Hamburg.

Shipbuilders have yet to invent a packet boat suitable for this kind of navigation. It should be built with temporary movable saloon and cabins, nearly level with the deck, and exclusively for summer use, during the excursion season. In the winter these should be unscrewed, taken quite away, the hold enlarged by occupying the lower part of them, and the ship thus adapted for merchandise and rough winter voyages. By these means the vessel might be profitably applied to both uses and do duty all the year through. As it is, the shortness of the Norwegian excursion season renders it almost impossible for shipowners to build first-class and suitable steamers for such a service, and make them yield a fair profit upon the capital invested, without charging very high passenger rates.

The hotel at Hammerfest has sadly declined since 1856, though the present host is a simple, honest fellow, striving to do the best he can for his guests. For my bed, a plate of biscuits, and three glasses of port he charged only one mark.

A few more Sea Lapps had landed while we were away, but the total numbers were far short of what I saw in 1856. We were much amused in watching a little courtship scene enacted in the main street. A Lapp youth with an approximately clean face was walking by the side of a well-dressed Lapp girl, holding one of her hands between both of his. She made great show of struggling to extricate her hand, but did not actually pull it at all, her muscular writhings being expended on the arms and shoulders, without extending to the wrist. At last she yielded, and they walked cosily together, looking very happy, and nowise disconcerted by our observation.

BRIDE AND BRIDEGROOM. Winter Homes of the Fisher Lapps. This display of coyness appears to be an old-established form of propriety among these people. Scheffer ('History of Lapland,' published 1674), describing the procession to a Lapp wedding, says: "'Tis here to be observed that the bride, like one struggling against it, and endeavouring to the contrary, is dragged along by the man and woman that are to wait upon her, and would seem to admit of her marriage with great reluctance, and therefore her countenance makes show of extraordinary sadness and dejection."

On my first visit to Hammerfest, when I saw so many of the Sea Lapps eating their suppers, saying their prayers, and going to bed so publicly, afloat in their little open boats under the sunny midnight sky, I wondered how they fared in winter time; but on this occasion I found, on wandering to the east end of Hammerfest, a row or street of their "gammer" or winter residences, shown in the engraving opposite. These are built of turf, and *now* have actual glass windows, which is, I am told, one of the modern innovations upon the primitive gammer. To those who are not fastidious in the matter of atmosphere, such thick-walled turf edifices are charmingly snug and warm in the winter time, when the animal heat of a large family is added to that derived from the rude fireplace. The family residence in the foreground on the left has considerable architectural pretensions, due to the stone abutments at the corners, and is quite luxurious in the matter of windows. The second is endowed with a startling innovation in the form of a chimney pot.

August 1st-2nd.—We leave Hammerfest at midnight. Being Sunday, we have many passengers making short trips between the local stations, and among them a few Lapps in their Sunday clothes. When thus attired, and more or less washed, they are greatly improved in appearance. There was one Lapp girl on board, utterly clean, carefully dressed, and very pretty indeed. The sturdy Uhlan who was thrown from his horse by the mosquitoes, is very skilful in the production of rapid sketches of scenery, which he drew most effectively with Faber's coloured wax pencils. He was in raptures about the beauty of this "schöne Christine," and drew her portrait, for which she sat with charming patience.

I noticed to-day some confirmations of Mr. Robertson's statements respecting the mixture of the Lapps and Norwegians. Many boats came alongside to land and embark passengers making short Sunday trips. Some of these boats were rowed by bearded semi-Lapps, of whom the portrait below may be taken as a sample. I have no recollection of seeing such people hereabouts during my first visit—only the true smooth-faced Lapp and the Norwegian.

We reached Oxfjord at 6 a.m., and Bergsfjord at 10 a.m. Near the latter station is a fine example of a miniature sneeford or nevé, and a fork-formed double glacier streaming down from it, showing fine vertical crevasses where the two arms of the glacier branch out laterally from their common centre.

We have not been fortunate in the matter of glaciers on this journey, on account of the thick weather hiding altogether the great inland ice-region of the Fondalen, and the snow remaining on the surface concealing so much of the features of the small glaciers on the coast. The best were hereabouts, between Oxfjord and Tromsö, which we reach about 9 p.m.

We are rather startled on learning that about two days after we left the Hôtel du Nord it was burnt down during the night. As may be supposed, a purely wooden structure of this kind was rapidly destroyed. No means of escape from the upper stories being provided, a woman who was sleeping there lost her life. She threw herself out of window to escape the flames, and was killed by the fall. While we stayed there our party was divided: three slept on the ground floor, and the others, three ladies and myself, on the upper story from which the woman was killed. Had we been there at the time of the fire, our chances of escape would have been very precarious.

Wooden houses should never be raised more than one story above the ground floor. We were told that arrangements would be made for the building of a good hotel, which I hope will be thus constructed, or built of brick or stone.

Having failed to see the reindeer when we previously visited the Lapp camp in the Tromsdal, and an excursion to the fjelde in search of them being unlikely to succeed, as they wander over a very wide range, we adopt the somewhat undignified device of ordering and paying for a special performance. An ambassador, whose fee is one dollar, was despatched to the camp with full powers to negotiate for this object.

August 3rd.—Our plenipotentiary returns shortly after midnight, having fully succeeded in his mission. In consideration of a payment of three dollars the reindeer will be brought down from the fjelde for our special entertainment at 3 a.m.

We accordingly start at 1 a.m., find the valley in nearly the same condition as before, and reach the huts at about 2.30. All is silent, nobody is moving. The doors of the huts are closed, but not fastened. I open the foremost, my old acquaintance that has stood so long, and there behold a happy sleeping family. Men, women, children, and dogs, impartially distributed, are snoring together on equal terms upon reindeer skins spread on the ground. **LAPP PATRIARCH.**

Presently we arouse them. The patriarch, the same that I saw in 1856, but somewhat melted down since that time, considerably wrinkled, and his red hair changed to fawn colour, was the first awakened. He came out, stared around him rather vacantly, evidently astonished at seeing so many ladies at that hour (the men were all away when we were here a fortnight ago), but at last appeared to recollect the ambassador, and to become conscious of

the object of our visit. He then crept into the hut, and awakened the women, children, and dogs.

I was pleased to observe that he and the women went to the stream hard by, knelt down, and washed their hands and faces, but cannot certify to their habitual use of such ablution. It may have been an extraordinary performance in honour of their visitors, and in part consideration of the three dollars. The women then brought forth komager, and horn spoons for sale, as before, and some of the filaments of tendon of which they make their sewing thread. They showed us their mode of spinning it. I had previously supposed that the distaff and reel were the simplest forms of spinning apparatus, but here learned that the machinery of the Lapp spinster is still more rudimentary. She takes several of the tendon fibres, places them side by side and end to end with ends overlapping, then draws them between her lips as they proceed in length, in order to effect a temporary adhesion. When this preliminary salivated thread reaches about three feet in length, she holds out one end in one hand at arms-length sideways, then spits upon the palm of the other hand and rubs the nearest end of the thread between the wet palm and her cheek, with a stroking action which twists the whole together. This is repeated several times. She shortens the thread as she proceeds, in order that the intermediate portions may be twisted firmly against the cheek. By this means a very strong well-spun thread is produced; so strong that salmon fishers in Norway are glad to obtain it for their lines.

We gradually become more and more sociable; the unfavourable impression produced by the metal buttons at our last visit appears to have been removed by the three dollars. Coffee is prepared, offered, and accepted. We join the family breakfast party, sit upon the boulders which are arranged around the fire and do duty as chairs, find the air of the hut more breathable than we expected, and the mixture of coffee and reindeer milk very good. It is served in a very limited number of Staffordshire-ware cups, and sweetened with lump sugar.

We wait very anxiously for the approach of the deer until about 4.30, when the Lapps espy them on the mountain ridge that terminates the upper part of the valley. We cannot see them yet, but presently something moving in the distance renders them visible to our unpractised eyes.

By slow degrees and tedious effort they are brought down the slope, the leader of the flock being lassoed by the horns, and forcibly dragged along by one of the men. It is a continuous struggle between man and deer, the man having gravitation on his side, as the deer struggles to ascend the slope. A number of dogs are also occupied in keeping the herd together and driving them onward.

In spite of all the efforts of men and dogs, several deserted the herd, and bounded back towards the fjelde. At last the majority of them was brought down and driven into a square enclosure rudely made of tall palings.

We enter also, and stand in the midst of them. They are about a hundred and twenty in number, all galloping about very wildly, but quite harmless, avoiding us very carefully, though much crowded. Otherwise their horns might have been unpleasant with such rapid movements in close quarters.

Their voices are quite unromantic, exactly like the commonplace grunt of a vulgar pig, and they grunt in unison as they gallop round the enclosure.

Scheffer's translation of the love-song of the Lapp poet, beginning with

"Kulnasatz my Rain deer We have a long journey to go; The moors are vast, And we must hast, Our strength I fear Will fail if we are slow, And so Our songs will do," had led me to suppose that the relations between the Laplander and his reindeer were of quite an affectionate character. Other readings confirmed this impression, but all this poetry is cruelly destroyed, not only by the dragging and driving to bring the deer down to the enclosure, but by the subsequent proceedings within it, and what I learn on the spot concerning the ordinary incidents of sledge-travelling, as represented on the opposite page.

Instead of the gentle creature coming lovingly to be milked, and receiving the caresses of the milkmaid, the whole business of milking is an exciting chase. One of the women, holding a wooden bowl in one hand, points out to one of the men the particular doe upon which she will next operate. He is armed with a cord coiled round his arm, and doubled so that he holds the two ends, and thus the free end forms a long loop. He approaches the

indicated victim as nearly as he can, which presently starts away. At this moment he throws the lasso over her head, and holds fast. The loose cord hangs upon the neck and is prevented from slipping by the horns. Then a violent struggle commences, the man gradually shortens the cord until he reaches the deer, and seizes its horns. The woman now comes with her bowl, The Realities of Sledge Travelling. slaps, or rather punches, the udder very violently, and finally, with considerable muscular effort, drags out a small quantity of milk, about sufficient to fill a teacup or claret glass. The doe is then released and bounds away. This is repeated in every case.

A little boy who was learning to use the lasso, and displaying to us his skill, was pulled down, and dragged a long distance upon his back before he mastered the deer; the men had to wrestle with their full strength to avoid a similar overthrow.

The reindeer are smaller than the pictures we commonly see would lead us to suppose, and it is difficult to believe that they can draw a sledge with a man in it.

They are very ragged at this season on account of the shedding of last winter's coat. This is quite loose, and may be gathered by handfuls from their backs. The women were thus gathering it, and told us that they sell it at Tromsø for six skillings (about 3d.) per lb. It is used for upholstery work, for stuffing mattresses, &c., as a substitute for horse-hair. The bright red quadrangular expansion of the hat worn by the men (shown on page 151) is stuffed with this, and is thereby puffed out like a soft pillow. English upholsterers may find it worthy of their attention. A more careful examination of the huts revealed a few details I had not observed before. There are holes all round the bottom part of the turf-wall, for ventilation, evidently constructed in such manner that they may be stopped with turf or snow in the winter.

A baby in a leather case was an object of considerable interest to all of us. Its doll-like dimensions, very pretty features, and bright sparkling eyes were enthusiastically admired by the ladies, so much so that I became rather anxious and alarmed lest it should be offered for sale, and our luggage and my responsibilities thereby increased. Having witnessed the operation of rocking this baby, I am not at all surprised at the hardihood of the adult Lapps. If a Lapp baby should happen to be born with any loose viscera, or any fragile elements in its organization, the furious proceeding by which its crying is stopped could not fail to entangle and confound together the loose components, and triturate the fragile elements; thereby removing the feeble babies, and effecting "the survival of the fittest" by a method that has hitherto escaped the notice of Dr. Darwin. The tough babies would only suffer a mild amount of cerebral concussion, producing just sufficient vertigo or insensibility to stop their crying, and similar to the soothing giddiness that Livingstone experienced when shaken by the lion that held him in its jaws.

The old rhyme,

"Lullaby, baby, on the tree top, When the wind blows the cradle will rock," &c.,

is probably of Lappish origin, as it is customary to hang the cradle, or baby-case, in which the infant is firmly strapped, to a branch of one of the small birch trees, and leave it swinging there with a like anæsthetic effect.

During the early stages of babyhood the infant is deposited in an elongated egg-shaped capsule, and surrounded or imbedded in dry moss in lieu of swaddling clothes. This moss is thrown away and replaced by a fresh supply as often as necessary, thereby effecting a considerable economy of nursery laundry labour.

There is one feature of the social and domestic economy of these little people which has interested me very deeply, and is suggestive of some important reflections to the philosopher who studies the laws of human progress. Most writers tell us very positively, almost dogmatically, that the social status of woman advances with the progress of civilization, and may be regarded as a test of civilization; that among all barbarous or uncivilized tribes, woman is the slave of man, and treated like a beast of burden; and that this state of things is only improved by the general advance of refinement and intellectual culture.

Guizot, in his 'History of Civilization,' attributes the comparatively high social position attained by women in modern times among Western nations to the domestic influences of the feudal system, and the chivalry supposed

to be associated with it.

All these inferences and speculations are refuted by the Lapps. Judging from my own observation, I venture to say that there are no people in the world, however refined, among whom the relative position of man and woman is more favourable to the latter than among the Lapps. The Lapp woman is smaller and physically weaker than the man, but instead of the man using his superior strength as a means of tyranny, he applies it by taking upon himself all the hardest and most dangerous work that has to be done, and leaves the woman to her natural and highest avocations, the work of the household and her maternal duties.

The women carry the baby, but the heavier burdens are borne by the men.

When bartering their goods at Tromsö, the men carried the hides, the women the lighter parcels of embroidered shoes. All the heavy work of climbing to the fjeld and dragging and driving the deer down to the Tromsdal, where we saw the milking, was done by the men; and when the deer were collected in the enclosure, the men lassoed and held them while struggling, the women simply milking. In this case the women were masters, gave their orders to the men, who obediently caught and held the particular does selected by the women. In all their ordinary intercourse, there was nothing to indicate that any idea of inferiority of women was entertained among them.

From what I can learn, the position of the Esquimaux women is similar. Is this a matter of race? Is it because the men are not warriors? We must remember that the trade of murder is unknown among these people. They have no soldiers, fight no battles, either with outside foreigners, or between the various tribes and families among themselves. They have no warlike traditions, no territorial ambition, and cannot understand the meaning of military glory. In spite of their wretched huts, their dirty faces, their primitive clothing, their ignorance of literature, art, and science, they rank above us in the highest element of true civilization, the moral element; and all the military nations of the world may stand uncovered before them.

CHAPTER VIII.

Raised beaches in the Malangerfjord — American fellow-passengers — Smoke-room confidences concerning the feeling of the South — A practical hint to intending emigrants — Virginian welcome to English visitors and settlers — My meteorological snubbing — Disappearance of the sea serpent and reappearance of the Seven Sisters — Bishop Pontoppidan's account of the great sea-serpent, and the still greater Kraken.

We leave Tromsö at noon. In the Malangerfjord are two raised beaches, visible on both sides, and extending for many miles. They differ from the terraces of till before described, and appear, as I saw them from the packet, to be narrow shelves or true beaches where the substance of the mountain itself has been worn away by some agency that has acted in horizontal lines. Whether this agent was the edge of a horizontal glacier, filling the valley to two different heights at different periods, or the wash of the waves of the fjord when it occupied these levels, I could not tell from the packet. A careful examination of the shore would doubtless decide this question, as in the first case there should be well-marked horizontal striation wherever the rocks have the close-grained texture requisite for the preservation of such markings, and where they have not been obliterated by subsequent atmospheric weathering.

August 4th and 5th.—We return by a somewhat different route, not crossing to the Lofodens. The weather still very bad, cold, misty, and wet. The stuffy air of the gentlemen's cabin led to much dissipation. The Norwegian and German passengers slept well enough, and seemed to care very little about the composition of the atmosphere they breathed, provided it was warm. The English and Americans grumbled loudly, and positively rebelled to the extent of forsaking their berths, and spending a large part of the night in the smoking saloon on deck. Among them was one of the American confederate generals, who had been engaged throughout the civil war, a typical specimen of the Southerner, a curious compound of refinement, chivalry, courtesy, and despotic

selfishness. Like most of the Southern men I have met, he was very intelligent and a most agreeable companion. I was deeply interested with his account of the war and its results. It is only by learning some of the details of such actual experience that one can form any adequate idea of the intense bitterness of this struggle. There were other Americans from the South on board, and some from the Northern States. I was informed by both that the discussion of political subjects must be avoided when both were present. The bitterness still remaining is so great that the precaution is quite necessary. I heard each side separately in the course of separate conversations.

It would carry me too far away from Norway to give even a short abstract of these conversations, but one or two matters may be stated. Speaking of the Alabama claims, General G—— laughed at the simplicity of our politicians who were humbugged by the bullying demands of the North, and feared a war between England and the States. He assured me that the South would do all in its power to bring about such a war, but the Northerners understand their own position too well to be caught in such a trap. "If a war were commenced," said he, "we should all declare for Queen Victoria forthwith. I could and would myself collect a force of a few thousand young men, all gentlemen volunteers, asking for no pay, but eager for the privilege of fighting against the North under the British flag, and every other general officer of the South could and would do the same. These would not be raw recruits, but most of them well-trained soldiers, burning to avenge the ruin which has fallen upon their once wealthy families. We are quiet now, because we know that when we did all that was possible, we were licked, and of course we should be licked again if we were to fight under similar or greater disadvantages; but we are not reconciled, and never shall be while any of this generation survives. Fifty years hence it may be different, but at present we hate and despise the Northerners more than we did at the beginning of the war."

I was most surprised when he told me that in some parts of the South they cherish the hope of a quarrel between the North and Great Britain so warmly, that they celebrate the birthday of Queen Victoria instead of the 4th of July.

He gave me one piece of practical information which I feel bound to publish, as it will be new to most Englishmen, and may be of considerable value to many.

He stated that in consequence of the destruction of capital, the abolition of slavery, and the ruin of so many wealthy families in the South, the value of real property has fallen so greatly that well-cultivated estates and good houses may be purchased for very trifling amounts, especially in Virginia. That Englishmen with some capital desiring to emigrate should go there, where they will be received with hearty welcome and hospitality; and that provided they keep clear of Northern "carpet-baggers" and avoid New York agencies of all kinds, they will be honestly dealt with and put in the way of purchasing advantageously and settling comfortably. The Virginians earnestly desire such English emigration, if only to keep out the Northern emigrants that they hate the more bitterly when they find them buying estates the war has cheapened, and thus fattening upon the ruin of the South. Among the other advantages he specified are good society, and old English habits and customs. The Virginians especially respect the old country, and make it a matter of pride that they continue to be English and are free from Yankeeisms of all sorts.

He laid especial stress on the necessity of paying no attention whatever to anything that may be told to English emigrants at New York, concerning the South. The Northerners there who have lived in the South commonly describe it as very dangerous and disagreeable to strangers. General G—— gave them credit for speaking the truth, according to their own experience. It is dangerous and disagreeable *to them*, but quite the contrary to English visitors or English emigrants. All conspire to drive Northern settlers away, and all emulate in their welcome to the English settler, and in efforts to make him comfortable in his new home. In illustration of this feeling he pointed to the Northerners sitting on another part of the deck, and said: "I associate with them while out here in Europe, and have no doubt that they are very good fellows; but if they were travelling South and called on me at my house, I would not know them, dare not on my neighbours' account be friendly with them; but if you or any other Englishman with whom I have thus travelled were to call upon me, my house would be your home so long as you chose to stop."

The Northern men obviously understood all this, and accepted the situation. Meeting here on neutral ground, both evidently felt the sadness of this unnatural estrangement very bitterly, and did their best to gloss it over in the meantime.

I feel bound to confess that I have felt myself considerably snubbed during this Arctic voyage. All my companions and fellow passengers had of course read 'Through Norway with a Knapsack,' and we had a copy on board. They therefore expected to see the sea serpent, to experience the pleasant paradox of sultry weather in Arctic latitudes, and to take my side in the contest about the change in the character of the light at midnight. In all these my programme was unfulfilled. It reminded me of my first appearance as a lecturer. My subject was electricity; my electrical machine, Leyden jars, head of hair, dancing pith figures, &c., &c., all performed beautifully at the rehearsal, just before opening the doors, when the air of the lecture theatre was dry and the insulation perfect; but all of them at the critical moment of exhibition broke down, owing to the condensation of the moisture from the lungs of the crowded audience upon the glass legs of the machine, and other insulating devices.

A similar condensation, in the form of wretched drizzle and rain, together with the unparalleled cold of this exceptional summer, killed my sea serpent, gave a very mythical aspect to my readings of the thermometer on board the 'Constitutione,' and my account of the sultry walk up the Tromsdal. Besides these, it rendered it impossible for me to verify for my own satisfaction, or to demonstrate to anybody else, the curious midnight change which I understand has been observed by many others since I first described it.

The old proverb tells us that—

"An evening red and a morning grey Are sure signs of a fine day; But an evening grey and a morning red, Put on your hat, or you'll wet your head."The Italians say—

"Sera rosa e nigro mattino Allegra il Pelegrino."

There is doubtless much truth and reliability in these prognostics. According to them it is only when the weather is generally fair that the evening tints are warm and those of morning cool. If so, then fine weather is a necessary condition for the existence of the change which I observed at the midnights of my previous journey. As the amount of difference just before and just after midnight is very slight, demanding all the conditions to be favourable in order that so delicate a change shall be visible, it is not surprising that I failed to recognize it this year. In 1856 the weather was glorious, as favourable for this as for my sea serpent.

My sufferings were rendered the more poignant, inasmuch as at the early part of the voyage I crowed very loudly in proclaiming my own infallibility. I had sketched and had the temerity to publish my sketches of Torghatten, the Hestmand, and the Seven Sisters (I will now relieve my conscience by confessing that they were my first attempts at sketching from nature).

I returned to the originals with some little fear and trembling, all artfully concealed, but triumphantly passed the ordeal of Torghatten, my portrait of which was verified even in details. The Hestmand also, but I had not made him quite tall enough; still he passed muster, especially as I had erred on the side of modesty. When, however, we came to the "Seven Sisters," I was cruelly confounded in the manner already narrated. The case of the Sisters was trying enough, seeing that my justification was so long delayed; but that of the Kraken was still worse, as he did not appear at all.

The long low ridges of rock, that formed the coils of the serpent I saw in 1856, were there in countless numbers, but they were motionless. There was no continuous night and day sunshine glaring upon them now, to heat their surfaces and cause the atmospheric fluctuations, the distortions of unequal refraction, and the undercutting of the long southward slopes of the taller island by total reflection, which produced the monster's gaping mouth. The cold, drizzling, misty, windy weather had destroyed all the conditions upon which these optical illusions depend.

In spite of this, I have republished my original explanation of the monster's origin in the new edition of 'Through Norway with a Knapsack,' and have added thereto a portrait, drawn from memory, of his appearance

when I saw him; and immediately above it a reproduction of Bishop Pontoppidan's picture of the same.

In further elucidation of this subject I now add the following extracts from the 'Natural History of Norway' (1751), by the very learned and Right Reverend Erich Pontoppidan, Bishop of Bergen, and Member of the Royal Academy of Sciences of Copenhagen.

He commences with an account of the minor monster, the sea snake, thus:Page 195, English Translation.

"The Soe Ormen, the sea snake, *Serpens marinus magnus*, called by some in this country the Aale-Tust, is a wonderful and terrible sea monster, which extremely deserves to be taken notice of by those who are curious to look into the extraordinary works of the great Creator. Amongst these the Kraken, which I am going to describe, is to be considered the most extraordinary in length. But here I must again, as I did of the merman, first give the reader proper authorities for the real existence of this creature, before I come to treat of its nature and properties. This creature, particularly in the North Sea, continually keeps himself in the bottom of the sea, excepting in the months of July and August, which is their spawning time; and then they come to the surface in calm weather, but plunge into the water again so soon as the wind raises the least wave.

"If it were not for this regulation, thus ordained by the wise Creator for the safety of mankind, the reality of this snake's existence would be less questioned than it is at present, even here in Norway, though our coast is the only place in Europe visited by this terrible creature."

He then describes the general belief in its existence, and adds, "In all my inquiry about these affairs, I have hardly spoke with any intelligent person, born in the manor of Nordland, who was not able to give a pertinent answer and strong assurances of the existence of this fish; and some of our northern traders that come here every year with their merchandise, think it a very strange question, when they are seriously asked, whether there be such a creature; they think it as ridiculous as if the question was put to them, whether there be such fish as eel or cod."

He next proceeds with details of particular cases where the eye-witnesses have certified in writing and formally sworn at the sessions, before the Chief-Advocate of Bergen, the Recorder, sworn burghers, jurymen, procurators, &c. Copies of the documents are duly printed, but are too long for insertion here. Summing up the different accounts, he says of the *sea snake*, "Though one cannot have an opportunity of taking the exact dimensions of this creature, yet all that have seen it are unanimous in affirming, as far as they can judge at a distance, it appears to be of the length of a cable, i. e. one hundred fathoms, or six hundred English feet; that it lies on the surface of the water (when it is very calm) in many folds, and that these are in a line with the head, some small parts of the back to be seen above the surface of the water when it moves or bends. These at a distance appear like so many casks or hogsheads floating in a line, with a considerable distance between each of them."

This is followed by a long account of the poisonous properties of the creature, its aversion to the smell of castor, the questions of change of skin, structure of back-bone, &c., all treated with much learning. He again tells us that "it seems that the wind is so destructive to this creature, that, as has been observed before, it is never seen on the surface of the water but in the greatest calm, and the least gust of wind drives it to the bottom again." He discusses its malignity to man, and refers to some accounts of men being "snapt out of a boat" by this animal, and of boats being sunk, but adds that "I have not heard any account of such an accident hereabouts, that might be depended upon." Nevertheless the fishermen, "when they see one of these creatures at a distance, they row away with all their might (by which they sometimes injure their health) towards the shore, or into a creek where it cannot follow them."

He agrees with Peter Dass, author of 'Description of Nordland,' in regarding this creature as the scriptural Leviathan, and quotes the verses of Dass, from which I extract the following:

"When Julius enters on his princely state, And Sol turns back in his aerial course, Then does the hideous monster first appear."

Some “seafaring men affirm that the length exceeds 100 fathoms,” that “those round lumps or folds sometimes lie, one after another as far as a man can see,” and “if anyone inquires how many folds may be counted on a sea snake, the answer is, that the number is not always the same, but depends upon the various sizes of them; five-and-twenty is the greatest number I find well attested.” Adam Olearius, in his ‘Gottorf Musæum,’ p. 17, writes of it thus:—“A person of distinction from Sweden, related here at Gottorf, that he had heard the burgomaster of Malmoe, a very worthy man, say, that when he was once standing on the top of a high bill towards the North Sea, he saw in the water, which was very calm, a snake, which appeared at that distance to be as thick as a pipe of wine, and had twenty-five folds. Those kind of snakes only appear at certain times, and in calm weather.”

The above only refers to the “Sea Snake,” a creature of moderate dimensions. Section 2 of this chapter begins thus:—“I now come to the third and incontestably the largest sea monster in the world; it is called the Kraken, Kraxen, or, as some name it, Krabben, that word being applied by way of eminence to this creature”..... “Among all the foreign writers, both ancient and modern, which I have had opportunity to consult on this subject, not one of them seems to know much of this creature, or at least to have a just idea of it. What they say, however, of floating islands, as they apprehend them to be (a thing improbable that they should exist in the wild tumultuous ocean), shall afterwards be spoken of, and will be found applicable without any hyperbole to this creature.”

“Our fishermen unanimously affirm, and without the least variation in their accounts, that when they row out several miles to sea, particularly in hot summer days,” &c. He then tells how they find the water shallowed, and finally how the monster rises from the bottom, when “they immediately leave off fishing, take to their oars, and get away as fast as they can. When they have reached the usual depth of the place, and find themselves out of danger, they lie upon their oars, and in a few minutes after, they see this enormous monster come up to the surface of the water; he then shows himself sufficiently, though his whole body does not appear, which in all likelihood no human eye ever beheld (excepting the young of this species, which shall afterwards be spoken of); its back or upper part, which seems to be in appearance about an English mile and a half in circumference (some say more, but I choose the least for the greater certainty), looks at first like a number of small islands, surrounded with something that floats and fluctuates like seaweeds. Here and there a larger rising is observed like sand-banks,” &c.

In section 13 the worthy bishop takes up the controversy concerning certain appearances, which some have attributed to floating and vanishing islands, and others to the Kraken. He sides with the latter. He quotes Mr. Luke Debes, who, in his description of Faroe, “speaks of certain islands which suddenly appear, and as suddenly vanish. This is a thing nobody could comprehend; so that one ought not to wonder at the common people, and even those that were a degree above them, for looking upon these moving islands to be inhabited by evil spirits, which appeared sometimes in such places where the seamen, by daily experience, knew very well that there was no such thing as a rock, much less an island; but, however, they often found something at sea which had the appearance of land, and consequently were confounded, made false reckonings, and were taken out of their course, and brought into great inconveniences. Many seafaring people give accounts of such appearances of land, and then suddenly vanishing away, and particularly here in the North Sea.” “These (islands) could not possibly hold or stand against the violence of the waves of the ocean, which break the largest vessels; and therefore our sailors have concluded this delusion could come from no other than that great deceiver the devil. But, according to the laws of truth, we ought not to charge this apostate spirit without a cause. I rather think that this devil, who so suddenly makes and unmakes these floating islands, is nothing else but the Kraaken, which some seafaring people call *Soe-draulen*, that is, *Soe-trolden*, sea-mischief. What confirms me in this opinion is the following occurrence, quoted by that worthy Swedish physician, Dr. Urban Hierne, in his ‘Short Introduction to an Inquiry into the Ores and Minerals of that Country,’ p. 198, from Baron Charles Grippenhielm.”

The quotation is as follows:

“Amongst the rocks about Stockholm there is sometimes seen a certain tract of land, which at other times disappears, and is seen again in another place. Buraeus has placed this as an island on his map. The peasants,

who call it Grumars-ore, say that it is not always seen, and that it lies out in the open sea; but I could never find it. One Sunday, when I was out among the rocks, sounding the coast, it happened that, in one place, I saw something like three points of land in the sea, which surprised me a little, and I thought that I had inadvertently passed them over before. Upon this, I called to a peasant, to inquire for Grumars-ore, but when he came we could see nothing of it; on which the peasant said all was well, and that this prognosticated a storm or a great quantity of fish.”

“So far Grippenhielm. Now, who is it that cannot discover, at first sight, that this visible and invisible Gumars-ore, with its points and prognostications of fish, cannot possibly be anything else but the Kraken, Krabben, or Soehorven, improperly placed on a map by Buraeus as an island. Probably the creature keeps himself always about that spot, and often rises up amongst the rocks and cliffs.”

The above extracts refer only to the general appearances in which all agree, omitting particular and unauthenticated accounts of the monster being stranded and poisoning the atmosphere and the waters, another of his skin being left behind and used as a table-cover, &c., as well as those of fishermen having their hands poisoned by the water surrounding the animal, and of boats seized by his tentacles.

These details are very contradictory, some evidently describe large cuttle-fish, and the stinging of medusæ, exaggerated by fear and superstition. Underlying all these contradictions and absurdities there is the continually repeated and harmonious statement, that the monster is seen during July and August, and only when the weather is calm, and just in those localities where low islands abound. He disappears directly the wind rises, i. e. when the heated air to which I ascribe the appearances is carried away from the surfaces of the low glaciated rocks.

The vanishing and reappearing islands are doubtless due to nearly allied action, viz. the variations of refractive power of the horizontal strata of air, which are well known to produce remarkable upliftings of islands and coasts which are ordinarily below the horizon. This is not exactly the same as the causes of my sea serpent, but so directly connected with them as to render the confounding of the two phenomena by the old writers very remarkable and suggestive.

CHAPTER IX.

Suggestion for a new series of fortnightly Arctic expeditions — How ordinary tourists may reach as high latitudes as were attained by the ‘Alert’ and ‘Discovery’ — Scientific advantages of such expeditions — Trondhjem again — Changes in Norwegian hotels — Norwegian cutlery — The “tollkniv,” and its many uses — “Skaal” — A classical saturnalia — Emulating the Vikings — A railway that may propitiate Ruskin — Splendid railway panorama — A plea for common-sense railways in England.

Before leaving this the Arctic section of our trip I have a suggestion to offer, which I hope may “meet the eye” of some enterprising Tromsöite or others whom it may concern. It is that every season a suitable vessel be equipped for special trips in the Arctic Ocean, following the course of the Gulf Stream to the northernmost limits of open water between Spitzbergen and Novaya Zemlya.

The course that appears to me the most desirable is to start either from Tromsö or Hammerfest, follow the coast round the North Cape to Nordkyn, in order that tourists may see the noble headlands that form the Arctic boundaries of Europe, and the marvellous cloud of sea birds at Sverholt Klubben; then the vessel should steer due north, or perhaps a little to the east of north, keeping as nearly as possible in the middle of the warm water, with the simple object of reaching the highest possible open sea, north latitude.

The actual latitude thus attainable will doubtless vary considerably with the seasons. The ‘Nord-deutsche Allgemeine Zeitung’ tells us that last summer (i. e. 1876) Captain Kielsen, of the ‘John Maria,’ from Tromsö, reached 81 ¹/₂ north latitude by sailing in the direction I have suggested. He discovered an island with a

mountain 500 feet high, which he called White Island, and *the sea was free from ice up to the highest latitude he reached, and even beyond it*. He supposes that the polar ice-wall was, then at least, at a higher latitude.

Captain Kielsen thus reached, without any difficulty whatever, a latitude equal to the northernmost stretch of the 'Polaris,' within about a dozen miles of the winter quarters of the 'Discovery,' and barely sixty miles short of the highest latitude ever attained by any ship, viz. that reached with such serious struggling by the 'Alert,' and which has been so highly commended as a crowning achievement of Arctic effort. The northernmost limit reached by the sledging parties of the recent expedition was $83^{\circ} 20''$, but 110 miles beyond that of Captain Kielsen's northward sail, one which might be easily repeated on any similar summer as an ordinary pleasure trip from Tromsö.

As rounding the North Cape has now become merely a school-girl's holiday trip, we need only measure the magnitude of my proposed expeditions by their extension beyond this. About six hundred nautical miles farther north would give us the latitude of Captain Kielsen, or allowing fifty to one hundred miles more for the easting, we have an easy three days' trip for a steam-packet making only nine and ten knots per hour. Having daylight all the while, she may keep her course without hesitation or risk until the ice appears. From Tromsö and back again the excursion might be made in a week or eight days, and the "*Tourists' Arctic Expedition*" boat might sail fortnightly in correspondence with the present Arctic packet service, and would, I believe, even at moderate fares, pay very well.

Such an excursion would be exceedingly interesting. Every American "doing Europe" would be bound to make it, even if distasteful to him. Not to have seen the paleocrystic ice-wall of the North Pole would be as humiliating as to have omitted the Pyramids.

The class of tourists who would go merely in order to have been, would alone suffice to pay fair interest on the capital invested in the speculation. Added to these, by way of bonus, there would be the genuine travellers who would be induced to make such an excursion by an intelligent interest and curiosity urging them to explore the Arctic mysteries so far as prudent non-professional sailors may venture. They would see the most interesting portion of what we saw between Tromsö and Vadsö, in the same or less time. We left Tromsö at midnight on Saturday, July 25, and reached Tromsö on returning at 9 p.m. on Sunday, August 2; in time to meet and take back the proposed Arctic heroes and heroines.

Besides the northern coast they would have an opportunity of seeing Arctic icebergs, ice-floes, and the final Arctic barrier, that baffles human curiosity and the enterprise of our bravest explorers. It is quite possible that *on some occasions* they might reach a higher latitude than has yet been attained, as the limits of polar ice are very capricious and fluctuating, and nobody yet can tell what is the precise season or the particular conditions upon which the utmost extension of open sea depends.

The frequency of the excursions would test these conditions, and one or the other of the trips must of necessity fall upon the most favourable. As it is, with the grand polar expeditions so few and far between, it becomes a matter of mere accident whether favourable or unfavourable conditions are encountered. In the last and most elaborate yet organized, the conditions were singularly unfortunate. The polar pack had closed abnormally at the head of Smith's Sound, where our explorers went, and was abnormally open on the east of Spitzbergen, where they did not go, and had our "*Tourists' Arctic Expedition*" been then organized it might have beaten Nares and Markham in the matter of mere latitude.

Frequent excursions of this kind, aiming simply at getting as far north as possible, would afford very important contributions to geographical science. The course and limits of the northern extremity of the Gulf Stream might be determined thereby with a high degree of accuracy.

A regular and continuous series of observations on the northern limits of frozen sea water in one particular region, and that one the most open to the northward flow of the Atlantic, would supply most interesting and much needed information concerning the fluctuations of *general* terrestrial climate, and might throw considerable

light on some of the obscure problems of sunspot and other cosmical influences that are supposed to operate upon the mean temperature of this world of ours.

A large number of such observations would probably reveal some law or order in these fluctuations, and such law collated to other laws in obedience to the rules of Baconian philosophy may reveal many interesting truths that are perfectly unattainable by the most elaborate and costly polar expeditions that are only organized spasmodically at irregular, long, and accidental intervals.

There are many minor but highly interesting observations that might be made in the course of such excursions without any pretentious scientific paraphernalia.

A small set of ordinary meteorological instruments, a Casella's deep-sea thermometer, and a few well-used pairs of intelligently directed eyes, might record a great deal of valuable information respecting the conditions of the atmosphere, the temperature of the sea, the migrations of birds and fishes, in these high latitudes, that would be of the highest value when checked as they would be by the frequent repetition of different observers. Soundings to pick up specimens of the sea bottom at that portion which is alternately covered and free from the southward extension of the Arctic ice-wall would be especially interesting in reference to the origin of the "till," as will presently be understood. These trips would of course be only suitable to tourists who are tolerable sailors, and those who would not suffer any very serious inconvenience from an accidental detention such as might occur at some of the earlier trips before experience were gained in the matter of judging how far it is safe to venture after the ice begins to show itself.

For the same reason a reserve of provisions should always be carried, and some guns and ammunition. For my own part, I should not venture to take a boarding-school party of half-a-dozen ladies up to N. lat. $81^{\circ} 30''$, until after a few trial trips had been made, though I should hugely enjoy the excursion myself.

There is just that small element of risk, the remote possibility of a nip or freezing in for a winter, that would largely add to the interest and enjoyment of the trip by those properly prepared for it. It must, however, always be remembered that serious danger would be very remote indeed, seeing that the maximum distance likely to be attained is but three days out from Tromsö, from whence relief would be immediately despatched if the excursionists should fail to return at the end of the accustomed week of Arctic outing.

The vessel should be built for strength and safety rather than for speed. The Norwegians in general, and the whalers in particular, understand this matter full well and might be trusted. Rather more ventilation than they are accustomed to extort from the builders of whaling ships would be indispensable to English and American tourists; but they need not waste any capital on bird's-eye-maple panels, nor the tomfoolery of gilded mouldings and plate-glass ornamentation of the saloon, upon which so much is commonly expended in British and American passenger ships. Half the cost of this, expended upon the luxury of a bathroom, would be well appreciated by all civilized travellers of any nationality, not only in these, but in every other vessel that carries passengers from any part of the world to anywhere else.

We reached Trondhjem at about 1.30 a.m. on Friday, 7th of August. I am certainly not exacting in my demands upon hotel keepers, but seeing that we had been guests already at the Hôtel d'Angleterre, and were a large party, including so many ladies, I did expect that the telegram we sent the day before, bespeaking beds, &c., would have received some attention; the host knowing that we had made a long sea voyage since we left his house, and also knowing within an hour or two when the packet would arrive. Instead of this the house was closed, nobody seemed to expect us, no beds were prepared, and we had to wait a considerable time before we could obtain them. Our fellow passenger, General G---, who sent a telegram to the *Victoria* with ours, found a man from that hotel waiting for him at the pier.

The house had curiously altered during our absence. The large luxurious room which the ladies had occupied from 15th to 17th July was now converted into a sort of bazaar or market for fancy goods in vast variety, displayed on temporary counters arranged in parallel rows along the spacious apartment. All the next best rooms

were also occupied by the commercial men.

Although I have complained of the want of common courtesy displayed in the neglect of our telegram, I find no fault with these concessions to the commercial men, seeing that hotels are places of business, and that commercial travellers, such as those now in possession of this house, are far better customers than mere tourists, who only make flying visits during the short summer season, and who entertain no customers.

We nevertheless remained until Monday, and found the commercial travellers, mostly Germans, similar to those we met on the packet, and described in chapter iii. The ancient capital of Norway was in a state of festival on the 7th, celebrating the one thousandth anniversary of the colonization of Iceland by the Norwegians.

On the following day the ladies did a considerable amount of shopping; furs, photographs, and cutlery being the leading commodities. The stock of Herr Blikstad was seriously reduced, and orders left for duplicates of some of the stock which we quite cleared out. Blikstad is the “master cutler” of Trondhjem, and deserves the reputation he has acquired for supplying blades of the finest Swedish steel procurable.

Having lived a few years in Sheffield, and specially studied the technology of iron and steel, I was much interested in his wares, bought some myself, and have tested them since my return. They are excellent. It would be unjust to say that they are better than *can* be produced in Sheffield, but it is quite true they are painfully superior to the majority of the blades that *are* there made. There is no more shameful waste of capital, skill, and labour than in that which is thrown away in the manufacture of cutlery from bad steel. The difference between the worst of steel and the best, or between common wrought iron and the best cast steel, is less than 6d. per pound. Thus the difference of cost of material of the best and the worst of penknife blades is less than one-twentieth of a penny per blade, and of other knives in proportion to their weight.

The difference in the cost of working the harder material is about the same, or altogether one-tenth of a penny. Yet, for the sake of this wretched saving, millions of bad penknives are made, all the rest of the work in the handle, spring, &c., being thrown away upon the worthless blade.

The knife of a Norwegian peasant, the “*toll-kniv*,” is quite an institution. It is not a springing, opening, and shutting contrivance, like the English pocket-knife, but a stout blade, four to five inches long, simply inserted by means of a long tang into a handle, and protected by a sheath of wood or leather, which is always worn at the side. With this constant companion the Norwegian prunes trees, does much carpentry and cabinet making, mends his pens, shaves himself, cuts his food, and executes elaborate and artistic carvings. In the old times it was used in duelling, the combatants strapped together so that neither could escape; or, in a milder form, by each first stabbing a deal table, and then winding a leather thong round that portion of his adversary’s blade that remained unburied in the wood, the battle then being fought with the naked portion which had penetrated the table. The knives are now sold to tourists, and Blikstad of Trondhjem does a thriving trade therein. He makes the blades, and fits them into handles carved for the most part by peasant workmen. The material of these is wood or walrus tooth. Some of them are very elaborate and highly artistic, with elegant scrolls or characteristic national designs, such as the lion of Norway, or illustrations of the Frithiof, or other Icelandic saga. The artistic elaboration of such hard material as walrus tooth by self-taught peasants is very remarkable. The genius for carving generally breaks out in early boyhood, and is developed during the long winter nights when the general covering of snow leaves very little out-of-door work to be done.

On the Saturday evening—after the ladies had retired at an early hour even for the temperate zones—I had a taste of genuine Norwegian dissipation. Blikstad, the cutler, came into the apartment corresponding to an English hotel smoking-room. He had doffed his working dress, and was so transformed that I did not recognize him until one of the German travellers challenged “Herr Blikstad” to join in a “*skaal*” We then shook hands and did some more “*skaal*.”

For the benefit of the unsophisticated reader I should explain that a “*skaal*” consists in chinking glasses, clapping hands, and yelling that antique monosyllable after the manner of the Vikings. This we did at first with claret, the

common middle-class drink of Norway; but presently Blikstad became enthusiastic; his patriotism was warmed by the colonization of Iceland, by our adoption of classical Norwegian conviviality, and possibly it was also roused by the extensive purchases of my pupils in the morning, so he called for champagne. Then we did more of the classic skaal, thumped the tall glasses to make the liquor foam; then Blikstad called for more, would pay for all, and we skaaled again, until I thought it prudent to retreat in the midst of the skaal, lest the ladies should note any difference in my appearance at breakfast next morning. People who are subject to headaches should not emulate the Vikings. Skaal is not good for the liver.

On the Sunday afternoon four carriages drove to the door. Two English gentlemen, a lady, and an attendant. The name of one of the Englishmen was audibly spoken, that of the other was suppressed, but 'Punch' has rendered any attempt at travelling incognito quite impossible for the Right Hon. Robert Lowe. Even the Germans who had never seen him in the solid, at once recognized him as the original of many familiar portraits in the flat.

We commenced the overland portion of our trip on 10th August. The first part of the journey from Trondhjem to Storen was by railway and therefore done in a few hours. My conscience smote me when I took the tickets, and recalled to memory my former walk through the grand valley of the Gula. It seemed a cruel desecration to travel over such country by such means. I expected the usual panorama of tunnels and cuttings, and the maddening bobbing bo-peep of by-flying telegraph posts, but was most enchantingly disappointed, for here I rode, for the first time in my life, by an utterly unvandalizing railway. I hope, for his soul's sake, that Mr. Ruskin will go to Trondhjem in order that he may travel on this line, and thereby become reconciled to engineers and pardon them lovingly ere he dies.

It runs parallel and very near to the old carriage road; the engine pulled us up and ran us down the hills like a Norwegian pony; we followed all the windings of the river, losing nothing by either cuttings or tunnels; the engineering of the line rather displaying than concealing the natural grandeur of the scenery, especially in the deep gorge of the Gula, where the rails are laid along a narrow shelf of rock blasted out of the face of a precipice, and the snowy torrent below runs a wild roaring race with the engine and train above. The numerous lateral valleys that pour their tributary streams into the Gula are bridged across by the railway, and the pictures that are flashed forth, first on one side, then on the other, as the train runs across these viaducts, are sources of continual interest and excitement.

The terraces are very finely seen from the railway, their magnitude, general configuration, superficial extent, common level, and universality in the lower portions of the Gula and its tributary valleys, are better displayed than even to a pedestrian, so far as their general aspect is concerned. They are presented altogether in one fine panorama, and thus are better comprehended than when seen more slowly and in detail. This applies especially to the unity of the terraces of the lateral tributary valleys with those of the main valley. Those on corresponding levels are all seen to be continuous, winding round from one valley into the other and thus betraying their common origin.

The distance from Trondhjem to the present limit of the line is about forty miles. It will shortly be extended through the valley of the Glommen, and thus complete the steam communication between Trondhjem and Christiania. If carried on throughout in the same sensible and practical manner as at present, the journey over it will be one of the most charming trips in Europe.

The speed is about twelve miles an hour, including stoppages; at this pace the beauties of the country are visible and enjoyable, especially if a second-class carriage with open sides be selected, and there are such on this line.

If a railway company could be formed in England and managed in the interest of its shareholders, rather than those of its engineers and contractors, by directors exceptionally endowed with common sense, and with sufficient moral courage to construct single narrow-gauge lines with no great embankments, no tunnels, no deep cuttings, but which should follow the *ordinary* undulations of the country, only cutting off the extreme inclines, as a first-rate carriage road should do; and if in addition to this the directors had the still grander moral courage to defy the ridicule that would be poured upon them for limiting their maximum speed to twelve or fifteen miles per

hour, every town and village in the United Kingdom containing as many as four or five hundred inhabitants might be placed in railway communication with the present main lines; and every one of these little common-sense railways might be profitably worked. Many would be sufficiently served with a rolling stock of a dozen carriages and two locomotives, one in work and one in reserve, for use when the other needed repair. A dozen men might work the whole concern, and the same train run backwards and forwards, shuttle fashion, all day, excepting at the driver's meal times, and thus render collisions impossible by never having more than one train on the line.

I do not suppose for a moment that existing railway boards are capable of carrying out such a scheme. The directors of these are far too magnificent, their ideas of permanent way, of plant, of speed, of general management and expenditure, of patronage, parliamentary and other influence, &c., &c., are vastly too gigantic for what I propose. My common-sense lines must be constructed and worked by independent companies, or, better still, by individual and independent capitalists for each little line, and have no other connection with the great monopolies than permission to feed them by means of humble termini, so connected with the stations of the big lines, that the passengers could change from one to the other without leaving a continuous platform.

The advantages to many agricultural districts would be very great, and the whole country would benefit by their contributions to our food supplies, &c. People living in towns are strangely ignorant of the present isolation of many parts of England, Ireland, Scotland, and Wales, and the curious differences in the prices of some agricultural commodities that still remain in consequence of this practical inaccessibility. The carriage of a hamper from some of these places to London costs more than the freight of a similar package from the antipodes; i. e. from one of the ports of Australia.

CHAPTER X.

Our first roadside station — Fear and trembling — Needless alarm — The origin of female feebleness — The fetish of fashion — The political disqualification of woman — The first step needed for achieving her emancipation and elevation — The carriage — Modes of travelling in Norway — Hiring of carriages — Recovery of lost luggage — Bjerkager and reminiscences — Excellence of Norwegian roads — Nondescript vehicles — Humiliation and revenge — Model anglers — The valley of the Driva — Advantages of walking — Glacier striation — “Stosseite” and “Leeseite” phenomena.

We at first intended to leave Trondhjem on Saturday by the last train, to sleep at Storen and spend a quiet Sunday there. I sent telegram to station-master stating that “we are seven,” and asking for food and lodging. He was evidently alarmed, and replied that all his rooms were engaged. We therefore remained at Trondhjem until Monday morning, merely asking for vehicles by telegram. We found them awaiting us on arrival, started without delay, and halted for the night at the charming little station of Garlid, where the utmost neatness and comfort prevail with the least possible deviation from primitive Norwegian simplicity.

This being our first experience of a Norwegian roadway station, I was sorely afraid that my companions would be spoiled, and form expectations of Norwegian accommodation that would lead to serious disappointment afterwards. But as we proceeded I gradually learned that I had hitherto been over-anxious, and had underestimated the capability of delicately-reared English ladies to endure the hardships of rough travel. Now that it is all safely over, I do not mind confessing that I was at first terribly nervous, positively frightened at the responsibilities I had assumed, and as the time for starting from London approached, was almost wishing for an attack of the gout, or for a carbuncle, or some such valid excuse for giving up the enterprise. During all our long sea journey—the first and largest part of the trip from Hull to Bergen, and then round the North Cape and back to Trondhjem—I looked forward to this overland carriage climax with fear and trembling, and artfully arranged the route so that there should be a gradual initiation into Norwegian hardship, that the roughest and hardest part of the journey should come towards the end, when some training had been achieved.

But my terrors proved to be all delusions. I am now quite convinced that English ladies can travel and endure hardship just as well as Englishmen. Please to understand that this assertion is applied exclusively to the ladies themselves, and by no means to their luggage. It is not the natural weakness of woman, but the intolerable incumbrance of her ridiculous costume that cripples her physical energies. Imagine a regiment of cavalry in petticoats, or, better still, a whole army marching to battle in long skirts and several underlying strata of petticoats, each man being prohibited from showing his ankles under penalty of immediate degradation. Of what avail would be the muscular strength, the powers of endurance, the courage, and every other element of energy in an army loaded with such impediments, and encountered by men in manly costume, or even by women in tunics or short skirts? What has been the fate of the petticoated men of the East and other regions of the earth? They have been run down and overwhelmed by barelegged barbarians and trousered Anglo-Saxons.

If any member of the Alpine or other athletic club is disposed to underrate the physical prowess of the fair sex, let him try to ascend a difficult "col," to run a hurdle race, display on the horizontal bar, or play a cricket or football match in a lady's fashionable walking dress of the period, and he will then be able to estimate the extent to which, his sisters are handicapped, why they are so averse to wholesome out-of-door exercise, and consequently enfeebled both in mind and body.

I have very strong opinions on this subject, and am quite satisfied that all who agitate for the social elevation of woman have hitherto wasted their efforts, having failed to strike at the root of the evils they deplore. It is a gross fallacy to assert that woman is subject to the despotic rule of the male sex. The fact is exactly the reverse of this. But woman is the abject slave of a crushing, grinding, pulverizing, morally annihilating despotism—that of the obscure, nameless, unknown humbugs who, inspired by the demon of ugliness, draw, paint, print, and publish those hideous caricatures, those foul libels on the human form divine, those pictorial atrocities which periodically emerge from an unknown somewhere and represent the "*Modes de Paris*." The worship of this hideous fetish is the principal source of female degradation.

When I was young and sentimental I advocated female suffrage, but have long since given it up, and why? Simply because the stability of a constitutional country demands that the voters who govern it shall have some stability in their ideas and principles. National ruin must necessarily follow if the constituency of such a country are wayward and capricious, demand one thing to-day and the opposite to-morrow; if they are capable of being led first to the right then to the left and anywhere between; round all the points of the political compass, by designing interested trading demagogues. This danger determines the proper limit of extension of the suffrage in any country. Any lowering or widening that introduces this fatal element must be resisted stubbornly, in spite of all sentiment and all aspirations, however seemingly noble.

When the question of introducing a new element into the constituency is proposed, how are we to determine whether it is liable to this fatal disqualification? Simply by observing the conduct of the class demanding franchise in reference to some subject of leading interest to them, one in which they have to exercise judgment and free choice, and noting whether in this they are guided by fixed principles and exercise independent judgment; or whether herein they are feeble and inconsistent, and do the bidding, become the docile creatures, of selfish trading wire-pullers.

Now the subject of dress affords us precisely this test of the stability of female judgment. It does occupy a very large share of woman's attention, and herein she has, if she pleases, full freedom of choice. How does she use this freedom, this full power of election?

The steel-expanded skirts of one; the tear, and the bandaged legs of the next; the occipital chignon of yesterday, and the frontal forelock of to-day; that undecipherable Proteus, that ever-changing, monstrous or microscopic thing they call a bonnet; the multitude of useless appendages that overpass the possibilities of masculine comprehension and change perpetually in position, form, and colour, that are beautiful to-day and hideous to-morrow, according to the mandates of an invisible, unknown, and irresponsible millinery autocrat; all conspire to demonstrate that woman of the present generation is so easily enslaved, that to entrust her with political suffrage

would be simply to throw so much additional power into the hands of the designing demagogue, who would trade upon her instability of judgment just as the dressmaker, the draper, the milliner, the hairdresser, &c., trade upon her now by fooling her into the adoption of these perpetual changes of dress, merely for the purpose of compelling her to be continually buying the new rubbish that they designate “ the last thing out,” “ the newest fashion,” “the latest novelty,” &c., &c.

This grovelling submission, this cringing, sla-vish, and abject surrender of her own natural taste and independent judgment to the fetish of fashion, very seriously weakens and degrades the whole character of woman. Trifling and contemptible as it is in itself, it is no trifle in its demoralizing results. Character is not developed by great occasional events, but by the continuous pressure of daily incidents and habits, and this ever-present eagerness to bow and cringe and crawl under the yoke of fashion produces a permanent curvature in the spine of a woman’s soul.

When women shall have so far emancipated themselves from this tyranny as to select their clothing according to the dictates of common sense, convenience, economy, good taste, and artistic elegance : when they choose good, useful, and beautiful dresses, and wear them out; when the fluctuations of their fashions present no other changes than those demanded by change of season, the variations of age, personal peculiarities, the growth of taste, and improvements of materials, then they may be credited with sufficient stability of judgment and independence of character to be entrusted with a share in the government of the nation ; and, what is far more important, they will be more respected by each other and by the opposite sex, and thereby exercise the full force of that moralinfluence which it is their special and highest prerogative to wield.

Now, “ gentle reader,” pray don’t misunderstand me, and break out into any tantrums on the supposition that I am railing against pretty dresses, pretty bonnets, pretty ribbons, or any other really pretty decorations for pretty women. On the contrary, I maintain that beauty is one of the primary natural attributes of woman. It is a gift she has received from her Creator which she should most religiously cherish and cultivate. Due and proper attention to dress is one of her first duties. It is a duty that she owes to herself, to all around her, and more especially to those who are the nearest and dearest to her. The wife who neglects her home dress fails in one of her duties to her husband.

But in her study and practice of dress she should be an artist; she should select the style best suited to her figure, complexion, &c., to her means of expenditure, her health, and active duties; and having determined that style should abide by it, only making such modifications as are truly artistic or useful improvements. The “ duck of a bonnet ” of to-day would not then become the “fright” of to-morrow, and the fashion of women’s dress would then be objects of interest and admira-tion to sensible men, instead of being stock subjects of ridicule and contempt, as they are at present.

But I must not return from this rather extended digression without disposing of the stock stupidity which is commonly used as an argument, or rather as a lame excuse, for the fluctuations of fashion and extravagances of dress; that “ it is good for trade.” Drunkenness is good for trade in the same manner; war is good for the gun trade and the saltpetre business, murder is good for the hangman’s trade, arson gives employment to builders, and so on; there is no folly, no vice, no crime that may not be excused by this pitiful subterfuge, so long as people can be found who are blind enough to be unable to see that what is expended upon the millinery, the drink, the guns, the saltpetre, the hangmans wages, the building of burnt houses, &c., must be withdrawn from some other application that would equally benefit some more legitimate and more productive or beneficial industrv.

August IDA.—Our drive from the railway station to the charming little station of Gfarlid, where we slept last night and breakfasted this morning, was not a fair sample of Norwegian travelling, the station-master having a curious collection of vehicles of all nationalities; gigs,

pphaetons, landaus, and even dog-carts. Our genuine Norwegian experiences begin at Grarlid.

A little explanation is necessary in order to enable those unacquainted with Norwegian travelling to understand how we had to proceed. The national vehicle is the carriage, pictured below. As will be seen, the passenger and driver

Carriage.

are one and indivisible, sitting on a very low seat, which rests on the long shaft, and is placed between the horse and the axle of the wheel, but very near to the latter. This arrangement serves many purposes. 1st. The shafts act as springs, and in the ordinary country carriages are the only springs provided, though town-made fancy carriages, with steel springs added, are obtainable. 2nd. The weight of the driver being so near to the axle, the downward pressure on the horse's back is but small.

In the particular carriage here sketched the horse bears about one-eighth of the driver's weight, and this becomes considerably diminished or quite balanced, when his luggage is strapped to the luggage board behind, and upon this luggage is mounted the boy, girl, man, or woman who is there perched in order to drive the horse and carriage back. 3rd. A very important feature of Norwegian carriages, not generally understood and appreciated by tourists who use them, is the low seat and the necessity of stretching the legs forward till the feet touch the footboard, much the same as in rowing. The advantage of this is that if the horse should fall in going down hill, the driver is not pitched out head first and skull-cracked, as he would be from an English two-wheeled trap, but is simply brought up on his feet—standing on the foot-board. The apron adds to this security. 4th. The whole thing is a model of lightness and simplicity, combining the facilities of the saddle with the comforts of “a one-horse shay.” Besides this single carriage there are double carriages of the same general construction, the half-howl or boat-shaped seat being made of double width. These require a stronger horse and lower speed than a light single carriage.

There are two common modes of travelling. One is to purchase, or to hire for a term, a carriage and harness at Christiania, or other starting place, and to take horses at the stations on the road; the other is to hire both carriage and horse stage by stage. Both arrangements have their advantages and disadvantages. The disadvantage of changing carriages at every station is that the luggage has to be all unstrapped and re strapped at every stage of eight or nine English miles. With one's own carriage this trouble and delay is escaped; but on the other hand the permanent carriage is a nuisance when fjords have to be crossed, or any water stages taken, and this very commonly happens in Norway. The wheels have to be taken off when there is only a ferry boat, but in some of the steam-packets the carriage may be wheeled directly on to the deck and stand there. The charges for carrying these national vehicles on the water are very moderate.

On this journey I discovered another advantage of the permanent or private carriage that my

previous pedestrian experience had not made obvious, viz. that it secures a comfortable and sound vehicle, which is by no means always attainable at the stations. We met with some wondrous specimens in the course of our journey, but were exceptionally fortunate in getting through without any mishap.

My advice concerning the choice between these two methods of proceeding is, that when the intended route is not much broken by water crossings, you should purchase or hire a carriage for the whole journey. This is easily done at Christiania by the aid of Mr. Bennett, or the Christiania Carriage Company, and oftentimes at country places, especially when a carriage thus hired has been left to be returned. Could we have hired such carriages for our party from Støren to the foot of the Romsdal it would have saved a vast amount of trouble and anxiety. I tried to do so, was offered an old English phaeton to carry five by a pair of horses, but the ladies protested against so un-Scandinavian a vehicle; they had in fact set their minds upon carriages, and on the enjoyment of the novel excitement of driving themselves up and down the steep Norwegian roads.

I was the only timid member of our party, and actually trembled when I learned that some of the most ambitious in this matter of carriage driving, had never driven a horse before. I knew from previous experience that school-girls out on a holiday are not the most cautious of drivers, and had not yet discovered that element of safety

described above as the third feature of the carriole.

We began badly by leaving one box behind at Stören, but did better afterwards. There are no luggage porters, no “ boots ” at these farmhouse lodgings, these “ stations ” in Norway.

The traveller must help himself, and when there is a party of seven with boxes, hand bags, shawls, umbrellas, &c., all to be shifted at every stage, the unstrapping and restrapping and taking stock is such a business that an occasional missing of some luggage item is rather to be regarded as a necessary than an accidental incident. When such a thing happens, an express, in the shape I of a boy driving back one of the carriages, soon restores it, if it has not been discovered and sent on already. The perfect honesty of the people removes the larger half of these difficulties.

We drove over an admirable road through the open valley to Bjerkager station, where on my previous journey I had so much trouble in finding the human elements of the establishment and awakening them. It has, like most of the stations on this route, developed into something like an inn during the interval, but is still a farm and still has the group of houses inhabited by hay, cows, &c., that puzzled me of old. The host now speaks English, and is very attentive.

Beyond this station is a new road, one of those splendid specimens of this branch of engineering that are so abundant in Norway. I doubt whether there is any country in the world of equal magnitude where the average difficulties of roadmaking are so great as in Norway, and I may safely assert that there is none which is so well provided with roads—that is, which has equal mileage of good roads in proportion to its population. This road is a ledge blasted out of a rock wall, with the steep mountain slope on one side, a deep wild gorge on the other, and a raving torrent far below. At the short bends of road overlooking the line of the torrent the scenery is especially grand. At one of these points where the road passes perpendicularly above the torrent, the depth of the precipice along the brink of which the carriages are driven is seven hundred feet. Some pieces of rock stand up as protecting posts. This portion of the road was made in 1855, and bears the customary inscription stating the date of its construction. It continues to the next station, Austberg, where the valley opens. At Stuen station we had a foretaste of subsequent experience in the form of wretched vehicles. The station is small and ill provided; it was growing late and its best contrivances were out. Thus we were compelled to take the residue, some of which were not carriages nor describable by any accepted noun substantive. They nearly resembled the tray upon wheels so popular with London costermongers, but above the tray was a sort of wooden chair fixed to the middle of a horizontal wooden bar, the ends of which were nailed to uprights rising from the sides of the tray. The limited elasticity of this represented the springs of the vehicle. The reins were of cordage and appeared like superannuated clotheslines. This is the usual structure of the “ ribbons ” in rural Norway. Up to this point all had laughed at the queer harness and vehicles, and on surveying our cavalcade we wished it were possible to be bodily transferred with our equipages to the drive at Fop’s Alley in Hyde Park; at Stuen it became serious, and some of the ladies were driven to protest, but there was no help for us. We had the best obtainable, and therefore drove as dashing as possible to Aune station. It was rather trying to young ladies accustomed to cushioned carriages, drawn by well-matched high-stepping pairs of horses, to find that just in this particular case a party of young English gentlemen were resting at Aune, and came out to witness the arrival of our equipages. But we had our revenge. They were anglers, with a portentous display of rods, flies, landing nets, fish baskets, fishing hoots, &c., &c., &c. We asked them to let us have for supper one of the many large salmon they had caught. They had been fishing all day, and had caught neither salmon, trout, roach, dace, gudgeon, minnow, nor stickleback. Ha! ha! ha!

August 12th.— We now proceed through the valley of the Driva by another new alpine road similar to that already described, and comparable to the finest portions of the Simplon. This continues to the stations of Rise and Drivstuen, where we of course make the customary changes. At Drivstuen we divide, some driving and others walking on to Kongsvold, a pleasant variation, that now becomes appreciated, the novelty of carriage driving being somewhat worn down. We select a convenient time for this arrangement, viz. the stage preceding

dinner; the drivers ordering* dinner, which is about ready when the

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pedestrians arrive.

In the course of this walk I was much struck with the advantage of walking versus driving. Hitherto my pupils had not seen any good examples of glacier striation. I had just glimpsed several in driving past, and these were lost to the ladies, who were driving on separately. Now in the course of our walk over just the same kind of road, I was able to point out abundant examples of regular groovings. They may be seen hereabouts, especially on the new roads, wherever the deposit of vegetation has been stripped from the rock by the road makers. These patches show that the walls of all these narrow valleys have been ground, polished, and scratched in lines corresponding to the course of the valley, and the groovings and striae in many places appear as fresh as though but of last year's engraving. Besides these grooves in situ, other striations may be seen upon the flat slabs that form the barriers wherever the road edges upon a precipice. The rock being of slaty fracture, many of these slabs have been peeled from the surface by blasting, and tell their own history by the marks they bear.

All this was lost to the drivers, and more besides, for the necessity of attending to one's horse conceals a great deal. This, in my estimation, is the worst disadvantage of carriage driving. To those, however, who merely travel for fresh air and excitement, and to obtain a general view of the great features of the country, the carriage is almost unobjectionable.

In 'Through Norway with a Knapsack,' to which I must refer for further particulars concerning the scenery and people hereabouts, is a description (page 53, new edition) of a curious conformation in this valley of the Driva. It is best seen in going northwards. I have no doubt that these promontories are due to glacial action. They are a modification of what in Scotland is called "crag and tail," and show the direction of the ancient ice-flow, the smooth sloping side of these (the "*stosseite*") facing the direction of the flow, and the craggy side (the "*leeseite*") looking down the slope or to leeward of the ancient glacier. The reason why the *stosseite* or tail should be thus planed and smoothed by the advancing ice, while the *leeseite* or crag retains its original structure, is obvious on a little reflection.

CHAPTER XI.

Snehaetten invisible — Incomprehensible beefsteaks — Solution of the mystery — Ultramarine-blue blood — Fluctuations of scenery due to changes of weather — Mine hostess of Dombaas again — A geological puzzle — My theory of the origin of the till — Inverted structure of ancient glaciers and submarine deposits — The "ground moraine" theory of the till and its insuperable difficulties — Great submergence during glacial epoch — Effect of a Polar ice cap upon the sea level — The anomalous deposit on the Dovrefjeld, and its probable origin — The last legacy of the dying glacier.

We were unable to see anything of Snehaetten. The weather being so bad, the mountains were never clear of cloud. We had a good dinner at Kongsvold. Fish, stewed game of some sort, ptarmigan I suppose, and a substance of animal origin to which the name of beefsteak was applied. We were subsequently served with this at several stations, but were unable to solve the mystery of its composition, the host of the station being strangely reticent on all occasions. It evidently consists of muscular fibre, is brown and tough, but has no special flavour of any particular animal. We were divided in opinion concerning its zoological classification; some thought it reindeer, others had faith in its bovine origin, and the idea of horseflesh was even suggested.

For my own part, being a chemist, and knowing that the tissues of all the land mammalia are composed of the same elements in almost identical proportions, I ate this as I eat and relish all other animal mysteries that may be placed before me, provided they are well flavoured. But for their toughness, these segments of muscular tissue

were good enough. Since my return to England I have discovered what they are, and as they are so common at Norwegian stations, it is my duty to communicate the discovery. An enterprising grocer at Twickenham, knowing my appetite for curiosities, sent me “on appro” a sample tin of South American beefsteaks. On opening this I at once recognized the brown subangular fillets, the brown gravy, the fibre, and the flavour of the Norwegian mystery. This explains the determined and suspicious refusal of all the station proprietors to supply any particulars concerning it. They have heard of English prejudice against tinned meats, and would gladly allow their guests to suppose that they are indulging in the very very rare luxury of fresh beef.

We are now on the Dovrefjeld, and drive across its moorland expanse to Jerkin, by a new road, rather less hilly and less interesting than that222 THE 0 UGH NOE WA Y WITH LADIES.

over which I previously walked. Here I found the old and memorable station, but it was sadly altered. The good hostess gone, the old man, Jerkin of Jerkin, looked much older, but seemed as tough as ever. He was shoeing a horse when we arrived, and his daughter—the same that occupied the painted wooden cradle when I last halted here—waited upon us. The worshippers of pedigree should all stand uncovered in the presence of Jerkin or any of his family. If our aristocracy are blue-blooded because their ancestors came over with the Conqueror, the blood in the veins of Jerkin and the neighbouring farmers must be ultramarine, for they are of the same stock as William the Norman himself, only that their connection is with the elder branches of the old family, while the Conqueror descended from a younger son, who had to seek his fortune abroad; his elder brother holding the familv estates somewhere hereabouts.

The most direct descendant of Harold Haarfasrer is Tofte of Toftmoen, a station two stages south of this, on the direct route between Christiania and Trondhjem, that by which King Charles XV. travelled on his way to be crowned at Trondhjem in 1860; on which occasion Herr Tofte entertained the king right regally, bringing forth his ancient family plate, which included a sufficient supply of silver forks and spoons for all the suite of thirty or forty persons.

August loth.—Wretched weather, start late, drive over the bleak fjeld in a drizzle of sleet. I take this opportunity of noting that few countries are subject to greater changes of climate than Norway, and therefore that all descriptions of its scenery should be accepted as subject to a corresponding discount or premium. This should never be forgotten when we find discrepancies in the descriptions of the same scenery by different travellers.

A certain author writes the following :

“ A little before reaching ‘ Ovne ’ or ‘ Aune ’ station there were some of the most magnificent banks of pansies I ever beheld. Several patches of above a hundred square yards were covered with an unbroken carpet of these beautiful little flowers ; the variety, richness, and harmony of their colours were most exquisite ; they saturated the atmosphere far around with a delicious aroma which was almost intoxicating in its concentration when I slept upon them for an hour or two : the sunbeams poured upon me with a roasting heat, the rooks were cawing above, and the river rumbling below,” Ac.

We drove past the region of these banks yester-

day. There were neither violets, pansies, sunshine, nor cawing rooks to be seen anywhere near; where pansy banks may have been was soddened ground ; a Scotch mist enveloped everything, and the air was miserably cold. Had I not been intimately acquainted with the author of the above quotation, and firmly convinced of his unimpeachable veracity, I should have regarded his roasting sunbeams, his pansies, rooks, and aromas as utterly myths, and himself as an arrant humbug. Such are the perils to which such authorship is exposed. Had a vinegar-minded critic travelled over the same ground in such weather as yesterday’s, what a demolishing review he might have written!

We drove on to Folkstuen and Domhaas, over the widely-expanded mossy fjeld, and through a moving panorama of monotonous drizzle ; then rested, and dined at Dombaas. This is the station where in 1856 the kind hostess struggled so devotedly to feed the sick English lady, and where I conspired with the lady’s husband and the “

tolk " to cheat the hostess into believing in her final success. f Of course I now endeavoured to recognize her and speedily did so; not by her features, but by her pertinacious efforts to make us eat more than we could possibly digest. She loaded the table with lumps of roasted or baked veal and reindeer venison, the anatomical relations of which were quite undeterminable. We were all hungry and ate heartily, but our hostess was insatiable. When we told her we had finished, she produced another amorphous mass of venison, which appeared to have been subjected to a compound process of baking, roasting, and slewing, in order to suit all tastes; and she declared that unless we ate it she must conclude that we considered her meat bad. Finding this form of persuasion unavailing, she returned all the blocks of meat to the caldron or hot-pot from whence they came, and brought forward some pancakes, preserved fruits, and rich cream, all of precisely the same pattern as those with which she struggled to tempt the appetite of the sick lady eighteen years before. • We made her happy by enjoying this third course.

Professor Forbes, who travelled in Norway mainly for the sake of studying the vestiges of its ancient glaciers, says, in reference to the Dovrefjeld, " I looked with attention for any traces of glaciers, either by wearing and polishing the rocks where they came into view, or in the deposition of moraines, but I saw nothing very decisive of either kind. The friable and slaty rock is not favourable to the preservation of impressions of the former class, which are rare and ill-defined; nor are the mounds of stones, which are abundant enough, sufficiently characteristic to deserve the appellation of moraines. They are, indeed, sometimes disposed in elongated flat-topped ridges; but this is due, if I mistake not, to the eroding action of torrents which have gradually undermined them, leaving abrupt talus, which at first sight resemble moraines, but which, in their present form, it is difficult or impossible to identify. The surprise which I at first felt at observing no more distinct traces of ancient glaciers diminished afterwards, upon reflection that had such glaciers existed they must have covered contemporaneously the whole of the vast extent of the Dovrefjeld; that if they could have moved over such inconsiderable slopes, the motion must have been nearly insensible; that the traces of such ancient ice formations (if they existed) must be sought in the deep valleys or outlets of the fjeld, where the true glaciers must have protruded themselves from under the snow-line with a considerable declivity," &c.*

I had carefully studied Forbes's book before my first visit to Norway, and repeated the above

* ' Xorvrny and its Glaciers,' pp. 24 and 25. observations with the same unsatisfactory result, especially as " the deep valleys or outlets of the fjeld " display abundant evidences of glacier planing, but have no moraines at all commensurate with the work that has been done above. This and some other difficulties were, as already intimated, speculatively or suggestively solved on reading the first edition of Geikie's ' Great Ice Age/ and this speculative solution was confirmed by the crucial observations which my second visit enabled me to make.

This brings me to my theory of the origin of the till, which is simply that during the period of maximum glaciation the sea was much higher and deeper than at present, and that the glaciers of Scandinavia, Scotland, Wales, North England, and North America were thrust out into the sea, their lower portions floating upon the water, or just grazing the bottom of the sea, or resting firmly upon it, according to the thickness of the ice, and the depth of the sea at the different parts.

What would become of the debris of the glacier under these circumstances ?

The modern Alpine glaciers effect a sorting of their debris. The heat of the summer's sun melts their surface, and forms the well-known glacier torrent which pours through an ice tunnel and emerges from the foot of the glacier as a milky stream. This contains the fine filings, the mere dust grindings that the glacier has scraped from the rock, the larger shavings and the frost-severed fragments of the mountain sides remaining on or in the ice, and finally becoming deposited as the terminal moraine. Thus the modern or inland glacier produces first an alluvial deposit of fine clay, silt, or mud, free from boulders ; secondly, a boulder moraine, nearly free from mud, clay, or fine silt. Put these two together and we get the till or boulder clay, which forms such vast deposits in all the lower grounds of Scotland, in the lower flats of Sweden, the lower coast flats of the north of England and Wales, and which, as already stated, forms the lower part of those great deposits in the deep valleys of Norway now cut up into terraces. I found, as I expected, that the great flats and substratum of the shelly beach of Bodo and other

similar shores at the mouths of the Norwegian valleys are composed of till.*

* During our stay at Tromsø I had several opportunities of examining the sea bottom on the shoals that are numerous thereabouts, and found it to consist of stiff stony clay, covered with a loose layer of shells mixed with rubbish, evidently thrown overboard from vessels. Some of these shoals are high and dry, others only ankle deep at low tide. I found a similar bottom in the other places where I had an opportunity of examining a shallow sea bottom covered with clear sea-water beyond. If I am right, the ancient glaciers and also the present Arctic and Antarctic glaciers that float out to sea must have a structure that may be described as an inversion of the ordinary Alpine glacier. These latter are crevassed on their upper surfaces in consequence of their downward flow and their bending over at certain places in such a manner as to produce an upward convexity ; but the glaciers which I suppose to have spread themselves out upon the ancient sea must have been crevassed underneath, and their crevasses must

the reach of river sediment. Besides this I roughly tested the sea bottom at the North Cape, and all the stations where we stopped for fishing, by bumping down the heavy lead plummet, and feeling thereby the hardness of the bottom, then drawing it up and examining the lead that had thus struck the bottom, and which I also dragged whenever practicable. This showed the absence of bare rock in every case, and in some cases I brought up a sufficient film of dark blue clay to show that the bottom was a pavement of something very like the Scotch till, and derived from the grinding down of the slaty rocks of the district. Further and more effective sounding is necessary to properly establish this. Fishermen tell me that all the cod-fisheries are on “ banks ” of this kind; not upon rocky bottoms. The reason of this is obvious. Codfish are very voracious. I have examined the contents of the stomachs of a great many. Whelks with shells and their contents in various stages of digestion, are the most abundant. Other mollusca, the Crustacea, and fishes also common. I blush to add that they devour their near relations, whittings and haddocks, and even young codfish. All these live on or near the sea bottom and all must feed on something else. The pasturage supplied by fertile submarine meadows of moderate depth, such as great flats of till levelling up the deep submarine valleys must form, is likely to afford the primary food of the multitude of creatures which these vast shoals of voracious bottomswimming fish must consume. have gaped downwards instead of upwards, seeing that, when they reached the sea and began to float, the flotation must have produced such a deflection from their original downward course as would form a convexity facing downwards, and thus have produced the inverted crevasses just described.

In another important respect they must have been, if I am right, an inversion of Alpine glaciers, or more definitely speaking, of those portions below the neve or below the snow-line to which the name of “ glacier ” is properly applied. In these glaciers the chief waste, or thawing, occurs on the upper surface—according to some authorities there is even a growth below, due to regelation—and as is well known, foreign bodies deeply imbedded in the ice at the upper regions of Alpine glaciers are ejected ultimately, and appear upon the upper surface of the lower portions. My supposed out-floating glaciers formed during the glacial epoch, when the winter snowfall even at the sea level was greater than all the summer’s sun could thaw, would only thaw and thin out from below. While on shore and grinding along the rocks some degree of thawing would result from the friction, and the heat communicated from the earth’s interior, but the main source of their exhaustion and final termination would be due to the action of the salt water upon their lower floating surface. This must take place with considerable rapidity, especially if aided by ocean currents such as must have been very potent at that time wherever open communication with tropical waters existed.

Thus the exudation of all the contents of these glaciers would be downward ; they would have no superficial moraines whatever, and wherever the snowfall of the year exceeded or equalled the sun-thaw and earth-thaw of the year, these glaciers could never come to an end except by marine agency. Hence the nearly total absence of moraine vestiges in Arctic Norway, their rarity in other parts of Scandinavia, and the universality of the till or boulder clay in every place that under the supposed condition of deep submergence must have been under the sea and deep enough to escape the grinding action of the whole weight of the advancing glacier.

The reader will now understand why I observed

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so carefully the evidences of thinning out of the ice sheet described in chapter iv. The clear sweep of open ocean between this coast and the tropics supplies the conditions of effective circulation and consequent rapid thawing.OQO

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THROUGH NORWAY WITH LADIES.

I should add. that Mr. G-eilde adopts the hypothesis of a “ ground moraine,” or “ moraine profonde,” to explain the origin of the till. So far we agree, but he considers this to have been formed on shore or in subaerial conditions. I contend that it was formed as a deposit dropped from the bottom of floating and thawing glaciers. Both explanations accord with the composition of the till, i. e. as containing all the debris of the glacier, and the question between us is which explanation encounters the fewer difficulties otherwise.

I fully agree with all Mr. Geikie's arguments against the hypothesis that attributes the till to the droppings of mere icebergs.

The main difficulty of the ground - moraine theory is that of reconciling the existence of such a deposit with the tremendous erosive power of the glacier moving over it ; especially when we consider that at the time of its deposit from the thawing ice, the matrix, the present stiff clay, must have been a purée of thin slimy mud. To me it is utterly inconceivable that a glacier capable of eroding the hardest rocks, of scooping out lake basins in the manner so forcibly described by Mr. Geikie himself, could have rested upon this, have ridden above it while depositing it, as it must have done according to the ground-moraine theory.This difficulty assumes its greatest magnitude, a magnitude amounting, I think, to an absolute physical impossibility, in the case of the hundreds of long, deep, down-sloping Norwegian valleys, that all contain a great depth of this deposit in their lower parts. Down all such slopes the huge glaciers piled up by the ice-flow from the hills above, and aided by gravitation, must have carried with them and driven before them all their chips and filings had they rested on solid ground.

In the case of Switzerland, where the till lies at the bottom of a basin surrounded by mountain ridges, the difficulties of the ground-moraine hypothesis are not so great. There it may have been possible, but even there I think it more probable that the till was deposited from the bottom of a great mer de glace floating more or less completely on a lake formed by its own thawing, the outflow of which by the present outlets of the Rhone and Rhine was prevented by the ice barrier, just as the waters of the Margelin See are now retained.

The difficulty of my hypothesis is simply the supply of water to float the ice. With the present depth of sea and relative levels of sea and land, this would be quite insufficient; but we must remember that the present sea bottom is raised far above its original level by this very deposit itself,and that we have abundant evidence of a great rising of the sea or submergence of the land during the glacial epoch. The Arctic shells and sea sand on Moel Tryfaen, 1360 feet above the present sea level, is one of the most striking of these evidences. These shells, of no less than fifty-seven species of mollusca, are deposited in a bed of sand and gravel 35 feet thick. From careful study of this deposit Professor Ramsay “ estimated the probable amount of submergence during some part of the glacial period at about 2300 feet.” * The shells appear to have been “ an accumulation in shallow water or on a beach, and it probably acquired its thickness during the gradual subsidence of the coast.” f The neighbouring deposits indicate a further subsidence of about 1000 feet, during which the shells disappeared, and a colder climate followed. A thin stratum of stiff clay overlies the whole. The dying out of animal life with little or no change in the inorganic portion of the deposit, and the surrounding indications of subsequent glaciation, all justify the conclusion that the shells belong to an early stage of the glacial epoch, when the climate was gradually changing from its previous mildness ; and that the sea level gradually rose, or

* See Lyell's ‘ Elements of Geology,’ p. 159, 6th edition.

the land gradually sunk, just as the glacial climate advanced towards its maximum intensity.

But how could the sea rise, seeing that water always maintains its level ? is a fair question that may occur to the reader. The answer to this is very simple. A great accumulation of ice and snow upon any mass of land must, by its gravitation, draw the waters of the ocean towards it; will raise the sea level on the shores of the land that is thus overtopped with additional matter. The amount of this uplifting of course depends upon the quantity of ice and the proximity of the sea. I will not here trouble the reader with any attempt to calculate the probable or possible extent of this raising of the waters, but merely note that the normal or ordinary sea level is determined by the gravitation of the whole mass of the earth, and that the mean distance of this mass from any given sea surface, or from the water on any particular sea-shore, is about four thousand miles; that the force of gravitation varies inversely with the square of the distance, and therefore any mass of ice, at a mean distance of one mile from the water on this shore, will act with a force 4000², or sixteen million times greater than the mean force of the whole earth's attraction. This would of course be divided by the quantity by which the mass of the whole earth exceeds that of our supposititious mass of ice and snow.

I state this because estimates of the effects of such an ice-cap upon the sea level have been made, based merely upon the displacement of the earth's centre of gravity. This appears to me to be inadequate and fallacious.

The Dovrefjeld is a large undulating tableland, highest near its middle portion, slightly and irregularly sloping on all sides towards the numerous outlet valleys, which radiate in nearly all directions, and form long gullies or notches of much steeper slope than that of the fjeld itself. It is also surrounded by mountains, many of them considerably higher than its highest portion (Sne-haetten rises 3500 feet above the middle of the plateau), the radiating valleys of course lying between these mountains.

The magnitude of Forbes's difficulty will be easily understood on reflecting upon these conditions. Unless the glacial epoch is altogether a myth, this plateau, about 4000 feet above the sea, and between 62° and 63° north latitude, must have been a great sneefond or neve, a reservoir of snow and ice supplied by the accumulating snowfall upon itself, plus all the avalanches and creeping overflow of snow from the surrounding mountains. It must have been supplied with snow and ice, just as a mountain tarn in temperate regions is supplied with water, and, like the tarn, must ultimately have discharged its accumulations. The discharge must have taken place by glaciers pouring down the outlet valleys. These valleys should be eroded, smoothed, and striated ; and if the glaciers were like those now filling the Alpine and Scandinavian valleys, their moraines should be discoverable, and of vast magnitude.

But, as already stated, the erosion of the valleys, the planing down of the mountains, the striation, and all such indications of tremendous glacial action are evident and everywhere ; but no moraines of commensurate magnitude are to be found. This portion of the difficulty is, I think, solved by my supposition that the outlet glaciers spread away over the sea, expired there, and left their legacies of till at the bottom, as already stated.

But what are we to say of the ambiguous deposits that Forbes did observe, " which at first sight resemble moraines, but which in their present form it is difficult or impossible to identify " ? I looked for these on my first journey, found them, and being unable to solve the riddle, gave it up, as I may well have done, seeing that so eminent a glacialist as Professor Forbes had failed to solve it.

On my second visit I have been more presumptuous ; having come prepared to look for certain things, I saw much that was not visible to me before, and which, in like manner, evidently escaped the attention of Professor Forbes.

I observed that the plateau of the Dovrefjeld is not a hump, or rounded plain of bare rock, merely covered with a skin of vegetable mould such as carpets the slopes of its outlet A-alleys, and some of the " roches moutonnes " (glacier-planed rocks) of other parts of Norway. Instead of this, it is covered with a peculiar deposit (varying in depth from two or three inches to more than a foot), which is neither an alluvial nor a marine deposit, nor does it

correspond with those usually described as glacial. It is neither a terminal, lateral, nor medial moraine ; it is neither boulder clay nor till, but something for which I will venture to coin a name, and call it “ glacier gravel ” or “ boulder .sand,” as distinguished from boulder

clay.

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It differs from till by the absence of the matrix of stiff clay. It differs from what is usually called “ boulder clay ” by the absence of even a soft or friable clay matrix. It differs from moraines by the presence of a large proportion of sand, its stony fragments being deposited or imbedded in this sandy gravel, just as the stones or boulders of till and boulder clay are deposited or imbedded in plastic clay.

But the stony fragments of this “ boulder sand” are not, so far as I was able to examine them, either striated or planed sufficiently to be identified thereby as of glacial origin. They differ very little, and that little only in a slight subangularity, from freshly-broken rock fragments or ordinary talus debris.

Regarding it as a whole, it may be described as a fragmentary heterogeneous deposit of more or less gritty sand, and angular or very slightly sub-angular fragments of all sizes, from sand grains to large blocks, all loose and deposited without pressure, and with little evidence of long travel. These lie pretty nearly as they might had they fallen on the spot in showers from the sky.

What then is the probable origin of this ambiguous deposit ? I regard it as the last legacy of the dying glacier-fond ; its personal effects left upon the spot where it expired, when the change of climate terminated its existence.

A neve' or sneefond like that which must have covered the Dovrefjeld would receive the debris carried by the ice-flow from the surrounding mountains, and during the vigorous period of its mature existence would, by its continuous overflow, transfer this to the outlet glaciers of the radiating valleys ; but when its decay commenced this overflow would diminish and presently cease, the residual and still considerable accumulation melting on the bed of its own plateau. During this melting process the water produced by the thaw would wash away the minute particles of slaty rock, or decomposed feldspar, &c., that is, the slimy matter capable of producing clay when deposited without disturbance; but this gently flowing water would leave behind the larger particles of gritty quartzose and other rock matter capable of forming sand and gravel. Such residuum would obviously correspond with that which I have described.

The soil of the glacier farms, already described as so curiously characteristic of the Arctic and subarctic coast of Norway, is similar to this, and I have no doubt has been formed in like manner.

I have observed another deposit nearly resembling this, and covering the surface of many of the terraces. This appears to be due to a washing and redeposition of the underlying till; the washing effected in some cases by rivers, and in others by sea waves breaking on an ancient strand of till, like that which I have described as at present existing at Bodo.

As either of these deposits consists of the total glacial debris minus that portion washable away by water, they are almost identical in structure, although their origin may be different. Without going further into details, I think I have made out a fair case for my client, this “ glacier gravel ” or “ boulder sand,” as being worthy of respectful attention and careful study by geologists.

I may add that it exists somewhat abundantly, and with many modifications, in England, Scotland, Wales, and Ireland. After my first visit to Norway, and during a few years' residence on the Hope Mountain in Flintshire, I very carefully studied the details of the glaciation of the surrounding district,* was much puzzled by a similar deposit, and, suspecting its origin, looked especially for it in Norway. But for this I might again have missed it on the Dovrefjeld, as it is covered almost completely with mossy vegetation. It is, however, well seen at the roadsides, especially where it has been cut through to form the new roads.

* Some of the results of these observations were stated in a paper "On the Ancient Glaciers North and East of Llangollen, and more particularly in the neighbourhood of the Hope Mountain," read at the British Association, 1865. For abstract, see p. 77 of 'Transactions of the Sections ' for that year.

RIt is deeper than might at first be expected, that is, more is now lying on the Dovrefjeld than actually stands upon existing ordinary glaciers. But this great table-land sneefond was not an ordinary glacier; the outward slope is so moderate that its ice must have been piled up to an immense height before it could gravitate or be squeezed away radially to overflow the outlet valleys.

But to return to my diary. We were at Dombaas when I got upon the glaciers again; had just been doing our very best to satisfy our good hostess that the boulders of veal and venison, the pancakes, cream, and preserved fruits were acceptable and appreciated. After this we branched off from the main road between the ancient and modern capitals of Norway, and turned westwards towards the Romsdal, driving over a dull fjeld road to Holoker, where we found good quarters and rested for the night.

CHAPTER XII.

The pace of carriage travelling — "Fast" and "forbud" stations — Catering for a large party — Precautions to be adopted — The reputed lake of two outlets — The Romsdal — Reindeer stalking — Probable extension of this sport in Norway — The waterfalls of the Romsdal — The Romsdalshorn — Curious dissipation of waterfalls by the sun — Miniature glaciers — The Troltinderne — The Aak Hotel — Luxurious idleness — A gathering of English tourists — Sociability of Englishmen — The terraces at the mouth of the Romsdal — Society in Norway — The fate of the travelling snob when he tries Norway.

I retain the diary form of my narrative in order that readers purposing to go over the same ground may see the extent of our daily progress, and thus learn the practical possibilities of ordinary Norwegian travelling. I must, however, add that we travelled leisurely. A single tourist or a small party of two or three might do a good deal more—with pushing perhaps fifty per cent. more. Our numbers rendered the halt at most of the stations much longer, on account of the necessity of sending to a distance for supplementary horses.

There are two classes of stations, "fast" stations and "forbud" stations. The first are bound to have a certain number of horses daily in readiness for tourists, and their book shows how many have gone out at any time of the day, as each traveller enters what he has taken. The forbud stations are those where a tourist may wait for two or three hours unless he sends "forbud," i. e. a messenger to bespeak his requirements. This messenger generally travels all night, carrying with him the forbud papers or orders for all horses and carriages the tourist may require during the whole of the next day.

On the Dovrefjeld road between Christiania and Trondhjem, and also that of the Romsdal, all are fast stations; but when so large a party as ours arrives after some horses have already been sent out, the limits of the resources of the station are likely to be overpassed, and the station-master may have to borrow horses from a neighbouring farm. In Norway the next-door neighbour may be a few miles distant.

Besides this, the number of beds at these stations is limited. At many, our party would have overtaxed the total resources of the establishment; at others we just filled the house, and only at a few were there many beds to spare after we were accommodated. I had to exercise some generalship on this account, by learning before-hand the respective resources of the stations before us, and especially by halting early, going on no farther when we came upon a comfortable station at 5 or 6 p.m., or anywhere thereabouts. We thus usually halted at an empty or nearly empty house, but had we gone on past the average time at which tourists stop for the night we should at this, the height of the tourist season, have reached an occupied station late at night, and then might have posted to another and another, and so on until morning, before finding room for so many. I forewarned my pupils before starting of our liability to this, and of the probable necessity of dividing into two or more sections; but by making

inquiries and by thus halting early, we escaped any such separation throughout the journey. In steering a large party through Norway these contingencies must always be kept in view, and due allowance made in estimating the rate of progress.

August 14th.—The wild moorland fjeld continues for above twenty miles beyond Dombaas, and then skirts a long slope, at the bottom of which are the long dreary lake, or rather lakes, called the Lesjevand.

This has been described as a lake with two outlets, and has been the theme of some discussion on account of the reputed anomaly. I am sorry that I cannot take either side of the controversy, not having had time (a whole day would be necessary) to investigate it. This lake is unquestionably situated just on the watershed of two long valleys; the Romsdal, down which the Rauma flows northwestward, and the valley of the Logen, which river flows in a south-easterly course towards the G-uldbrandsdal. The maps show these rivers flowing from the opposite ends either of the Les-jevand, or of another lake, the Lesjeskogo Vand, connected with the Lesjevand by a ligament of river. This ligament, or a constriction of the Lesjevand near Lesje, may be the seat of the mystery of which I am unable to suggest any further solution.

On reaching Stueflatten station we fairly enter the Romsdal. All being good pedestrians, we scorn to desecrate this glorious valley by driving hurriedly through it, and therefore send our luggage forward and walk on.

For myself, I was slightly tremulous. Vie had with us a copy of 'Through Norway with a Knapsack,' wherein I have described this valley with so much enthusiasm that the possibility of having overrated it, the danger of raising excessive expectations inducing reactionary disappointment, suggested itself rather disagreeably, especially after the pansies.

But this uneasiness was soon dissipated; we all found that no recollections nor anticipations, however glowing, could overrate the glories of the Romsdal.

The panorama of waterfalls commences with those of the Rauma itself, at the Sletta Foss, about half-way between the Stueflatten and Ormein stations, where a hoard and arrow points to a path leading to a wooden bridge, built for the purpose of affording a good view of this roaring foaming cascade. Even here in the Romsdal, the recognized lion of Norway, there is no gate and no demand for coppers. The bridge has been built by somebody for the free gratification of everybody.

We stop early at Ormein, a very comfortable station. A path is now made from the station to the triple Yervedals Foss. This path terminates opposite the fall, but beyond it to the right are some ledges on the face of the rock, affording sufficient foot and hand hold to enable anybody safely to climb round the projection, and land on a small platform or broader ledge of rock, presenting a fine view of the larger fall, and just within its spray. The ladies had no difficulty in reaching this point.

There is a great deal of venison hereabouts, and many reindeer skins offered for sale. The legal season for stalking and shooting the wild reindeer commences on August 1st.

As the Romsdal is a deep gully, cutting through the midst of the highest mountains and the most extensive snow and ice fields of Norway, it naturally becomes the head-quarters of reindeer hunters. It appears from what I can learn that the wild reindeer has increased of late, and that this increase is due to the strict enforcement of fence time, which extends from April 1st to August 1st in this district, and from October 1st to August 1st in the Shrieval district, north of Osterdal. This is much farther north.

Reindeer hunting is a respectable *sport, very different from shooting barn-door pheasants that have been hatched by hens in coops, and fed by hand until the poultry-yard sportsmen come from town to have them driven to their gun-muzzles at a battue. We met several genuine sportsmen who had come to Norway mainly for the reindeer stalking. No beaters are employed in this chase. A native stalker, who knows the ground and the habits of the deer, may be engaged at Jerkin, Dombaas, Kongsvold, and other stations at one dollar per day or thereabouts. It is possible even to do without this amount of aid, but I should not recommend anybody to attempt deer-stalking alone, for the same reasons that I advise them not to repeat my lonely fjeld walks of 185G. A

sprained ankle, a broken leg, or other accident or ailment, but slight in itself, might, when thus beyond the reach of help, be fatal.

Pluck, patience, self-control, endurance of hardship, and the general qualities of true manhood are demanded of the wild reindeer hunter. Two or three weeks may be spent in the chase, with the game more or less in view all the time, before the opportunity of a shot is obtained. The huntsman is living all the while on the wild moorland fjeld, and more or less upon the snow, feeding upon what he carries plus occasional windfalls of tiadbrod and draughts of milk at solitary saeters. He sleeps in huts or on the rocks, always keeping hidden and to leeward of the game ; as the scent of a man to windward is detected by the deer long before he comes within gunshot.

I was told of several cases where three or four deer were thus followed for several days, when at last, just as the sportsman had crept within

a few yards of gunshot, he was seen or scented; the deer bounded away and were altogether lost. The largest herd of this season in this district amounted to fourteen, and they have kept together unusually well. Some Frenchmen were fortunate enough to come close upon them after only a few hours' stalking—were well sheltered and in the most favourable position possible—but one of the Gallic hunters became so excited that he started up, crying “Tive la chaise!” and thus terminated their opportunity. I expect that in this neighbourhood the sport will be further developed, as the Norwegian stalkers find themselves better paid by guiding Englishmen than by shooting the deer themselves. They tell me that they are doing their best to leave them unmolested for the benefit of English sportsmen.

August 15th.—All on foot again and walk from Ormein to Fladmark. The grandest part of the Romsdal is between Ormein and Horgheim, and may be called “The Yalley of a Thousand 'Waterfalls.” They pour in such profusion over the rock walls on either side that they may be counted by scores, all visible at once, and fresh cascades are coming in sight continually. We have a splendid sunny day; this, following the continuous rain and the abundant remaining snow, displays the Romsdal to best advantage. This second visit exalts still further my admiration of its magnificence.

My former estimate of the height of the Roms-dalshorn (4000 feet above the valley) is below its actual height. It rises to 4950 Norsk feet above the sea, equal to 5090 English. As the valley is about 400 feet above the sea hereabouts, its clear height overhead is about 4690 feet, and it starts up so perpendicularly that a good thrower, standing on the summit, might hurl a stone down upon the excellent carriage road at its foot.

The precipice down which the majority of the finest cascades is falling forms a dark wall by the roadside, rising in many places to nearly 4000 feet above it. This is the case where the Mongefoss pitches over the wall of the Mongejura, the summit of which is more than 5000 feet above the valley, but is hidden by the wall.

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The Dontefossen which pour directly down by the roadside start at an altitude of 3700 Norsk feet.

I noticed a very curious phenomenon to-day. Several of the nameless multitude of minor falls pitch over the precipice, and after descending about 1000 feet or thereabouts disappear entirely. This occurs especially on the north wall, against which the rays of the midday sun were battering in full force as we passed. The falling water starts as a blue thread, where the upper edge of the rock scrapes the sky, then it swells a little and becomes a snowy streak, the fragments of which almost float in the air, and wave about in the wind. This feathery mist gradually diffuses and diminishes until at last it absolutely melts away into invisible vapour, the completeness of its dissolution being proved by the dryness of the projecting rock below, on which it must have fallen had its liquid state survived. This evaporation is doubtless effected by the combined action of the direct sun rays and the radiation from the dark absorbent rock wall.

I did not notice this before, and therefore presume that it only occurs when the sun is shining, as it has been to-day. The sky was clouded when I walked up this valley in 1856.

There is a path to the Mongefoss, free of course, though closed by a cattle gate ; but this fall is nearly as well seen where its waters pass under a bridge of the road.

My journey over this part of the valley is doubled, as one of the ladies left her watch and trinkets at Ormein, and I take a carriage to fetch it; but before reaching the station, meet a boy strutting along the road with the chain round his neck, outside his jacket, and the watch and appendages ostentatiously displayed. He was on his way to Aak, where he assumed that we should stop for the night at least, and was heartily enjoying the finery in the meantime.

The ladies walked bravely on to Aak, where we had arranged to halt, not only for the night but for a rest on the day following.

The miniature glaciers were seen as before, and the observations made in 1856 confirmed. Without disputing the general conclusions respecting the great extension of ancient glaciers, I still believe that in many cases local avalanche tracks and deposits have been confounded with glacier paths and moraines. This, however, is merely a matter of detail nowise affecting the great and interesting geological generalizations that are based on the glacial vestiges.

These miniature glaciers and avalanche heaps are well displayed in the hollows between the jagged peaks of the wild witch-crag, the Troltin-derne, a magnificent group of dark complicated pinnacles, the weathered skeleton of a riven mountain. These peaks reach a height of above 6000 feet nearly opposite to the Romsdalshorn,

August 1 ('Eh.—Spend the day in luxurious repose at the Aak Hotel, finely situated at the mouth of the valley and commanding grand views of the Romsdalshorn and the witch-crag. It is deservedly a favourite resting place for tourists; for besides providing all that is demanded by any reasonable people in the matter of hotel comforts, the proprietor holds a salmon river and shooting ground for the benefit of his guests. We find more than a dozen English tourists already there; some of them were our fellow passengers on the Haakon Adelstein.

We English have somehow acquired a reputation for reserve, but there is no justification for this in the present generation. If such reserve ever existed as a national characteristic, our railways and other modern facilities and habits of travelling have quite destroyed it. Here we found a number of strangers all as united and sociable as the guests in a private house, and I find the same everywhere in the course of travelling. The only “ stuck-up ” and unsociable people we have met in the course of our journey was a small party of Belgians and Frenchmen, who were travelling to the North Cape with a talk, and trying to assume the airs of noblemen in disguise. The contrast between their sulkiness and the genial joviality and unaffected good-fellowship that so freely prevailed among the English community onboard the steam-packets, &c., which included several English noblemen undisguised, was very amusing, when viewed in the light of the customary French descriptions of English habits and character.

There are some terraces at the mouth of the Romsdal about 120 feet in height. As far as I could judge from a superficial examination, they are all composed of alluvial sand. They were probably deposited by the Rauma when the sea was 120 feet higher than at present. Unlike the stony clay terraces I have already described, these appear to be composed only of that portion of glacial debris which can be carried by the torrent due to the melting of the ice. They resemble the deposit now forming in the Rhone valley, and by the other rivers that are flowing from Alpine glaciers.

I should add, that the Aak Hotel can now accommodate above thirty visitors. Our bill amounted to 20 dollars 20 shillings, about 31. 18s., or a little more than 11s. each. We had supper on Saturday evening, rooms two nights, board the whole of Sunday, and breakfast on Monday morning. Those who take rooms “ en pension ” by the week pay less than this. The table, bedrooms, &c., are all that gentlemen or ladies may require, though not grand enough for snobs. The following is a copy of the wine card :

“ Pirns Courant pa a Yin og Öl Hotel Aak.

Sp. d. mk. skill. St. Julien, per tl 0 3 0 Ditto, half 0 1 12 Margeaux 0 4 0 Château Leoville 1 1 0

Graver ... 0 2 0 Niersteiner ... 0 0 a 12 Muscat Frontignon ... 0 3 18 Pajarite ... 1 0 0 Port Yin ... 1 1 0 Ditto, half ... 0 3 0 Sherry, Pale ... 0 4 0 Ditto, half ... 0 2 0 Sherry, Golden ... 0 4 -0 Ditto, half ... 0 2 0 Madeira ... 1 i 12 Champagne 2 0 0 Brus-limonade, Selters, Soda, j Öl Bajersk j > each 0 0 12

The Aak Hotel is altogether a charming place for a summer sojourn, and many English stay there for a considerable time. Besides the salmon fishery, the shooting, &c., the country all around affords a large number of short one or two day excursions of great interest. There are always many visitors, and judging by those I met and the general character of British visitors to Norway, the society must usually be very agreeable. Please to understand that when I speak of “ society ” or “ good society,” I do not use such terms in their common perversions. I do not at all refer to the rank or the wealth of the visitors, but simply to their intelligence and conduct.

English society in Norway, whether it be made up of the occasional two or three visitors one meets at an ordinary roadside station, or one’s fellow passengers in the packets, or the exceptional accumulations at such places as Aak and the city hotels, is usually exceptionally good, not merely because it includes many of the aristocracy, but because Norwegian travelling effects a sifting process, or what Darwin calls “ natural selection.” Vulgar snobs, who bully the waiters, sip their soup and then send it back with a sneer, who find fault with the “ cuisine,” abuse the wine, merely to proclaim their superiority ; ill-taught imbeciles, who advertise their high culture by pumping their h’s, affecting the “ dwal ” of the imaginary “ bloated awistocwat,” and all the allied genera of social impostors, are snuffed out before they have spent a week in Norway, and speedily return home, never to revisit the land of fladbrod.

This blessed consummation is effected by the admirable treatment to which the travelling: snob is subjected by the hotel keepers, and more especially by the bonders, who are proprietors of the stations and surrounding land. When a low fellow enters a station and gives his orders with insolent assumptions of superiority, the bonder quietly fulfils his contract with the Government by supplying the visitor with just such entertainment as he is legally bound to offer, and nothing more: then walks away and resumes his farming operations. The rest of the household follow, and thus his snobship is left to thump, and roar, and swear, as long as he chooses thus to amuse himself.

Mr. Bennett told me of some superfine swells who were travelling this summer with first-class private carriages, who did the imperious, demanded “ hest strax ” * (a horse, and look sharp), and otherwise treated the simple farmers insolently, until presently they arrived at a fast station where the full complement of horses had already been sent out, and the host was not bound to supply any more unless of his own goodwill ; and where the stipulated number of beds were already engaged. The host might have

* This word “ strax,” too readily learned by Englishmen, is very offensive to Norwegians when used in a tone of command without the softening qualification of “vaer saa god,” “be so good.” This “vaer saa god” is the first phrase that every tourist should learn, and use continually. It is a common complimentary expression, and, used as a prefix to every request, acts like a talisman in securing prompt and cheerful attention. Obtained horses, might have given up his own bed and slept in the hay barn, had he chosen; he would have chosen and would have done so for gentlemen or ladies, as many a one did for us during our journey; but for these puppies he did nothing, and treated them with deserved contempt; they were consequently obliged to harness themselves to their own carriages, and wheel them thus ignominiously to the next station, eight or ten English miles distant.

This discipline is a fine disinfectant; it speedily rids the country of all such gentry.

CHAPTER XIII.

Molde — Fruit trees in the High Street — Inconvenience of private carriages — Variations of the character of hotels and stations — Captain Dahl — The Storfjord, the Slyngsfjord, the Sunelvsfjord, and the Nordalsfjord —

Sentinel whales — Eagle-nest farms — Tethered children — Probable origin of these farms — Destructive rock falls — Decent avalanche tracks — St. Olaf's serpent — The Muldals Foss — An overhead wire railway — Hellesylt — The Geirangerfjord — Phlegmatic waterfalls — The Seven Sisters — St. Olaf's head and pulpit — Start upon our roughest journeys — Dangerous driving — The Hovingdals Vand — Great depth of the lakes and inland fjords — Faleidet station and high feeding — A row across the Indvikfjord — "*Modes de Paris*" in Norway.

The Aak Hotel is about three English miles from Veblungsnaes, the port of the Romsdal. The hotel keeper provides carriages for this short stage, and early on Monday morning, August 17th, we embarked from this port, which has grown into a small town, resembling Hammerfest. Judging by the debris and odours of the beach and landing place, a good deal of sea fishing must be done hereabouts.

The scenery of the Romsdalsfjord is very fine, especially the panorama of mountains opposite Molde, at which town we land and make some exploration. It resembles Christiania in general appearance. Good, wide streets, clean, bright wooden houses, and a busy population, all apparently doing their fair share in the work of producing and distributing the requirements of life, and therefore honourably entitled to enjoy a full share of the pleasure of consuming them.

The number of fruit trees, &c., growing in the town surprised us. There are gooseberry bushes and rose trees in the main street.

We embark on the 'Lodden,' and steam to Aalesund. AVe had been sometimes disposed to envy the tourists who had private carriages, but now we see their inconvenience. Some of the passengers were sadly troubled by theirs, and wished they could get rid of them.

The captain recommended Gort's hotel, and we go there, but find it a cafe and drinking shop. They offer beds, but we decline, and go to Sporck's, which is much better.

I may here make a necessary note, viz. that any recommendation or condemnation that I or any other tourist may offer concerning any hotel or station should be received cum grano, inasmuch as the verdict may be just this summer and very unjust next year. These places change hands, and thus become altered, or—as more frequently occurs in Norway—they are held by simple country people, who at first have had no experience of tourist requirements, but are very anxious to please. They begin badly, on account of their want of knowledge, are criticised, thereby learn their shortcomings, and presently amend them. In this way considerable changes are effected in a short time. Bennett's 'Handbook,' which is revised annually, affords the latest information on these points, and includes all the stations recognized by the Government. Tourists generally co-operate with Mr. Bennett, by supplying him with any information demanded for the correction of his notes upon the merits of stations. I supplied some items of such information at the end of our journey in the interior, and found that similar information had already been given by tourists who had preceded me. The unanimity of these reports was interesting, and on referring to the 'Handbook' for 1876, I find them adopted.

August 18th.—We embark on the packet, commanded by Captain Dahl, for Hellesylt, to reach which we steam through the Storfjord and its branches, the Slynghfjord, the Nordalsfjord, and the Sunelvsfjord. This is a magnificent excursion, the scenery gradually increasing in grandeur, until it reaches its climax at the mouth of the Geiranger-fjord, of which anon. Until recently, this region was only accessible to a few of the hardest tourists; now, however, it is fairly opened by steam navigation, and is becoming properly appreciated. A share of the merit of this appreciation is fairly due to Captain Dahl, who speaks English well, and rivals the boatmen of Killarney in his enthusiastic fulness of knowledge of the topography and local traditions of all these fjords, and his obliging earnestness in directing the attention of his tourist passengers to every interesting object, and communicating his store of knowledge connected therewith.

The first part of the trip, the eastward course, through the Storfjord is the least interesting, the characteristic features developing themselves fully on turning southward into the Slynghfjord. This, and its continuation, the

Sunelvsijord, as well as its side branches, the Nordalsfjord and the G-eirangerfjord, are sea-paved gullies, lying between rock walls of steep incline, or nearly perpendicular, which rise from 1000 to 3000 or 4000 feet above the deep salt water. The first point specially named in my notebook is that part of the fjord near the station of Hove, at the mouth of the branching valley of the Stoldal; the valley of Stoldal itself, and the waterfall on the right side of the main fjord after leaving Hove, are very fine. 264 THROUGH NORWAY WITH LADIES.

The hills hereabouts are rich in ironstone. At Orskog is a mine, belonging, we are told, to a Mr. Savage, and communicating with the fjord by a very steep tramway. The herring fishery is evidently the staple industry hereabouts, as indicated at all the stations where the packet stops. Near to Hove we see two small whales, and our encyclopaedic captain tells us that they sport here in peace, and at the mouths of all these fjords, being protected by law on account of their reputed usefulness as sentinels on guard, that prevent the herrings from migrating into the open sea during the fishing season.

About a quarter of an hour past Hove, and on the opposite side, Captain Dahl directed our attention to a boat-house at the foot of a precipitous rock, and then to some telescopic objects about 1500 feet above it. These were farm buildings, or saeters, on a little patch of land, or flattened out oasis, a verdant shelf above the rock. One moving object was visible, a child, but we could not perceive whether it was free in its movements, or tethered. The local practice of tethering children to heavy boulders may appear somewhat uncouth to English mammas, but after seeing a few dozens of the eagle-nest farms of this district, the most conservative of womankind, Mrs. Gamp herself, would admit its necessity. The first of these to which our attention was directed (and such direction is real) demanded, as one might otherwise pass a score without seeing them) was, as already stated, about 1500 feet high; but in the course of the day we passed a number of others still more curious, some of them 2000 or 3000 feet above the deep fjord, with a mountain wilderness behind them, and the fearful precipice in front. An incomprehensible track, a winding staircase of giddy ledges, somewhere on the face of the precipice, leads to a little boat-house on the fjord, an invariable adjunct to these farms. This in many cases is the only available means of communication between these strange Robinson Crusoe settlements and the outer world.

I tried to sketch one of them, as the reader may see by the woodcut; but as my artistic powers are limited to the production of very rude diagrams, the reader will require to exercise his imagination, by supposing the perpendicular height from boat-house to farm-patch to be about 3000 feet, as was the case in this instance.*

I suspect that the majority, if not all of these, like the coast farms farther north, are the beds of

* I wrote the above before seeing the drawing on the block. I then found that Mr. Stanford had placed my rude sketch in the hands of an able artist who has sailed on these fjords and knows the farms well. On the basis of my rough sketch he has produced the admirable and truthful picture forming the frontispiece. 266 THROUGH NORWAY WITH LADIES.

ancient glaciers. That which I have drawn is a typical example, backed by obviously glaciated hills. If I am right, the farm-patch occupies the lower end of the glacier bed, where the ice has spread out on comparatively flat ground, after journeying down the steep slopes above, and just before its final precipitation into the fjord below. In chapters xi. and xii. of 'Through Norway with a Knapsack,' I have described some existing glaciers of the Justedal, which thus advance to the edge of precipices, then form bending cornices of ice, which finally break and fall.

I noted especially, that there is usually a small waterfall pouring from the midst, or the immediate vicinity of these farms. This confirms the hypothesis of their glacial origin, inasmuch as the ancient course of the ice drainage would correspond with the present course of water drainage.

The Robinson Crusoes who own and till these solitary oases are wonderfully versatile in their practical attainments. They build their own houses, make their own furniture, are coopers, basket makers, boat builders, and, in fact, jacks of all trades, or could not exist so far removed from communication with their fellow

creatures. They rarely send for the doctor, and yet are remarkably long-lived. I will not be so cynical as to insinuate that there is an}7 relation of cause and effect in this; but have little hesitation in attributing* it to the hardy, temperate life they lead, and to their immunity from all contagion, and every class of infectious disease or epidemic which the sins of one man visit upon his neighbour.

The boats that are so carefully protected by the boat-houses are built above, as there is no beach or footing below, and are let down by means of ropes. The launch of a boat down a 2000 or 3000 feet precipice, without any but the most primitive appliances, is not effected without some risk. The pine trees, which grow* abundantly on the ledges and from the crevices of the rock, afford important aid.

The risks of climbing, boat launching, and those which demand the tethering of the children, are not the only special dangers to which these farmers are exposed.

Nearly opposite to the mouth of the Nordals-fjord is a sloping bit of shore of several acres in extent. This is called “ Stranden,” i. e. “ The Strand ;” here is the church of Slingstad, and a metropolis of more than six or seven houses. In 1735 a mass of rock slipped down from the opposite side of the fjord, and the wave raised by its fall into the water washed away the church and swept many miles along the fjord, destroying all the boat-houses it encountered. Minor masses frequently fall.

We saw several tracks of recent avalanches, two of which had fallen during the last winter, and one in the previous October. The latter destroyed a boat-house and boat, and the others swept curiously near to farm buildings ; one which we passed at 6 p.m. was within twenty yards of -a farm building. As a modern avalanche track is likely to follow that of an ancient glacier, this proximity is to be expected.

In using- the term “ avalanche ” I must make

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some explanation. The tracks we saw were not caused by great accumulations of ice and snow slipping down in a broad sheet, as so commonly occurs in Switzerland, but were narrow stripes down steep rock slopes, rendered visible b)' the sweeping away of the trees and all other vegetation, leaving the bare surface of the rock contrasting strongly with the verdure on each side. They occur on the less precipitous rock faces, and where the farms are lower down than that which I have depicted. They are not mere snow avalanches, but chiefly made up of trees and fragments of rock; the denudation being due to the incline. Had a piece of rock given way or a mass of snow slid down from the neighbourhood of the farm I have sketched, it would have taken a clear leap over the precipice into the water, or at most would merely have touched some projections and then bounded farther forward.

Among the curiosities of these lakes, duly described by Captain Dahl, is “ St. Olaf’s serpent,” near to Sylte, the station situated where the Val-dalen opens into the Nordalsfjord.

The saint was in his yacht sailing up this fjord on his way to a dinner party, and was hurrying somewhat, lest he should be late and the soup cold. The sea serpent was also proceeding in the same direction, and was so impertinent as to cross the bow of the yacht and interfere with its progress. The saint remonstrated with the beast, but in vain, and finally lost his temper, leaned over the bow of the boat, picked up the scaly monster, and with miraculous energy flung it against the opposite rock so forcibly that it became imbedded there, and still remains. It is about 500 feet long, in several waving folds, and visible even at some miles’ distance.

Superstitious geologists contend that it is a contorted vein of quartz cropping out of the face of a gneissic rock ; but these presumptuous iconoclasts having attempted to remove so many other gene-

rally accepted landmarks of ancient history, we may deal with their testimony according to its merits.

We pass many waterfalls, which in any other country but Norway would be lions, but here they become matters of course. The Muldals Foss is one of the finest. Like the Yoring Foss, it pitches into a deep rock-hole of its own digging, disappears, and then foams out again from a chasm below.

We little expected to see anything so modern, artificial, and mechanical as an overhead wire railway hereabouts; but at "Vivian's iron mines" at Tafjord there was one in full operation, bringing buckets of dark ore, which at the distance appeared like ilmenite, from an open-face working in the upper part of the mountain. This appears to be a rich mineral district. We had on board a Norwegian geologist, who was "prospecting" with practical intent.

We finally reached Hellesylt, after a long day's excursion, not easily forgotten. From morning till night we were winding through an ever-changing series of lakes that may be compared with that of Lucerne, but surpass it in all its own especial elements of grandeur; with waterfalls, Crusoe farms, and the fossil remains of the sea serpent thrown into the bargain. The station at Hellesylt reminded me of old times. It is an unmodernized Norwegian station, rough, but comfortable. It is rumoured that a new one is to be built with some pretensions to luxury. If so, it will doubtless become popular with tourists as a centre from which some of the wildest scenery in Norway may be visited, and combining with this the facility of access by steam-packet and yachts.

August 19th.—In spite of our long day yesterday we rise at 4 a.m., and at five re-embark on the 'Aalesund,' which on its return journey steams up the Geirangerfjord, a sea valley branching westward from the Sunelvsfjord at a few miles north of Hellesylt.

In the Geirangerfjord we have the culmination of the wild grandeur of all the fjords of this region. Its only rival in Norway, I may say in the world, is the Naerofjord, which it resembles. Its unmeasured depths are walled by precipices which make a sheer perpendicular plunge of 3000 to 4000 feet down to its dark surface. Some eagle-nest Crusoe farms are even here, my sketch is from one of them; and gauzy waterfalls pitch from the unseen wilderness above over the sharp upper edge of the crag, and proceed downwards with a curiously deliberate and leisurely motion, waving gracefully in the air, or gently grazing the face of the rock. This absence of any hurry or violence of proceeding in the downward course of these waterfalls is so characteristic, so truly Norwegian, that I will endeavour to explain it.

When a stone or other heavy body falls through the air, the continuous pull of gravitation accelerates its downward speed. The same is the case with the plunging cascade of a river that is precipitated in large quantity to a moderate depth; but with spray-falls, where the height is so great as here or in the Romsdal, a curious modification of the general law of acceleration of falling bodies is observable. At the upper part of the fall the water is a continuous stream; presently this is broken by the acceleration tearing the lower and more rapidly moving portions from those above them; lower down, as the acceleration proceeds the collision between air and water breaks up still further the detached fragments of the original

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stream, and this continues till all is pounded into snowy spray. Every subdivision of the particles of water exposes more and more surface to the friction of the air, and this friction or resistance of course goes on increasing with the increasing velocity of downfall, until at last the resistance of the air just balances the accelerating force of gravitation, and thus no further velocity is attainable. From this point the remaining downward journey of the shattered water is performed with uniform velocity. Those waving streaks of gauzy water-spray, the "Seven Sisters" of the Geiranger-fjord, to whom Captain Dahl never fails to introduce his passengers, are beautiful examples of this class of waterfall. The Norwegians do nothing in a hurry, and these graceful ladies proclaim their nationality by moving with deliberate phlegmatic steadiness even when pitching over a frightful precipice.

St. Olaf reigns supreme over all the traditions of this district. His pulpit projects in bold relief at about mid-height of one of the rocks, and a thousand feet above this is the head of the saint in profile, with a prominent nose about 100 feet long, other features in proportion, all surmounted by a luxuriant crop of bristly hair represented by a rounded copse of fir trees.

On reaching the station, where the lake finally closes and finishes magnificently, we return after a short halt, and on again reaching its opening in the Sunelvsfjord, we find the boat we had engaged awaiting us, and in that we

row back to Hellesylt, which we reach at about 9 a.m., fully prepared for the breakfast that awaits us. Had St. Olaf's

Tserpent been filleted and fried we should scarcely have rejected it.

We now start upon the roughest section of our journey. From Trondhjem to the mouth of the Iomsdal we were on leading highways, with good roads and fast stations, where now-a-days ample provision is made for tourists; but between this and the Sognefjord we have, as a glance at the map will show, to travel nearly at right angles to the general course of the valleys, to cross ridges of hills separating these valleys, and also the salt water that fills so many of them. Besides this, the stations, with one or two exceptions, are "slow," i. e. requiring forbud, and most of them so rude, primitive, and small, that they cannot possibly accommodate so large a party as ours. Therefore I have had to carefully reconsider the whole route and divide it into daily stages, whereby we may arrive every evening at the exceptional and only available stations.

The first of these is Faleidet, on the Indvik-fjord, about thirty miles from Hellesylt; towards this we now proceed, having sent our "forbud" or courier in advance the night before to order the horses, &c., that we require for the day.

In the course of our drive to the first station, Thronstadt, we have a fair experience of old-fashioned Norwegian travelling, up and down hills that would frighten an English coachman, and over any sort of boulders or other impedimenta that have happened to fall from the hills or to be drifted by occasional storm torrents. The scenery is very wild and grand throughout this day's journey. At times we drive along a valley following the course of a torrent which forms a continuous series of cascades as it plunges over its bed of boulders and amidst a wild woodland. Then we ascend to a ridge and cross a fjeld surmounted by lofty mountains, then plunge into another valley, then open out a far-stretching fjord, and so on, continuously varying the drive.

The accommodation at Thronstadt station is fully catalogued by Mr. Bennett as consisting of "one large bed for two persons with sheep-skin rugs; only fladbrod to be got, but the woman is obliging."

The road grows rougher, steeper, and more irregular as we proceed, affording us ample opportunities of witnessing the renowned exploits of Norwegian ponies in galloping down steep hills. The younger whips of our party enjoy the fun of these headlong runs immensely, but just in proportion as they grow excited I become anxious.

When ladies are comfortably seated behind a fast horse, and with a good whip in hand, they are the most reckless and dangerous of drivers. They are peculiarly insensible to obscure, remote, or invisible dangers. In this case there was one possible catastrophe always painfully present to my mind, but which was fearfully disregarded by all my responsibilities, in spite of the great eloquence of my remonstrances. It was that of galloping headlong in single file close behind each other down a rough road, having the ordinary angle of a moderate house roof. Norwegian ponies do sometimes fall in the course of these flights, and the carriage driver is brought up in the manner already described (page 211); but if the foremost of six ladies should thus come to grief, the remaining five, being as helpless as Mazeppa in the matter of pulling up their steeds, must of necessity roll over the first, and altogether form a heap of debris, a human, equine, and vehicular moraine of horrible complication.

Every steep hill that we descended—and during this day's drive we were always descending such when not ascending them—presented this fearful contingency to my mind, hence my nervousness.

Speaking of Haughen, Bennett says, "Station wretched." We stopped, and entered the station dreaming of refreshment. We came out again fully convinced that Bennett was right. Individually, selectively, and egotistically I enjoyed this station and the preceding, inasmuch as the comforts of the Iomsdal and Dovrefjeld stations had made my descriptions of the hardships of Norwegian travel appear rather overdrawn. Here, however, I could introduce the young ladies to a sample of my old quarters in the Tellemark, and justify all my anxieties concerning the present route.

The scenery, however, is magnificent hereabouts, but the weather was very bad, and marred it sadly. The Horningdalskrakken was buried in clouds, and the grand view over the Horningdals Yand was half hidden in mist.

Sounding's have been taken in this lake down to

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1600 feet. It may be much deeper in some parts. Its surface is but 180 feet above the sea level, showing a much greater depth than that of the sea beyond. This is the case with many of the lakes and the fjords that stretch far inland. My explanation of this is, that the sea outside has been shallowed by the deposit from the out-thinning glacier, while the ice farther inland, near the greater mountains, was so thick that it rested on the bottom of these valleys, and eroded them as

These Indvik Fjords remain, and have more jelly, more bilberries, and more cream for luncheon. Then the wind falls a little, we pay a very moderate bill, nine dollars, and one mark to the "pigge" (i. e. the servant girl), after which we start with five rowers, who pull very hard for more than three hours. With less wind and brighter weather this row would have been very enjoyable.

Udvig is a very pretentious station, the young ladies of the house quite superior, and painfully denationalized by adopting the ugliness of Parisian fashions. Had they been dressed in national costume we must have admired their beauty.

The house presents a corresponding display of veneered and gilded furniture, and has a real drawing room. The substantial elements, food, bedrooms, &c., far inferior to Faleidet, the fleas energetic, and the charges comparatively high.

CHAPTER XIV.

One of the old Norwegian roads — A diplomatic boatman — "Tilsegelse" — Blundering tourists — Posting charges — The "dagbog" — Obligations of the tourist to the station keepers — A long stormy row on the Bredhjem's Vand — Getting wet and being wet — A Valley of Desolation — The most effective of all agricultural machines — The Jolster Vand — Black lakes — The colour of water — An explanation of this — Bituminous matter suspended in bog-waters, and the carbon particles upon which its colour depends — The Ulda Foss — Our condition at Nedre Vasenden — The efficiency of the Swedish stove — Bracing influence of northern air — Drive to Sande.

August 21st.—The toughest day's journey of all our trip is now before us. Its length is inevitable, as all the intermediate stations are mere hovels, some so bad, that I should be inclined to shirk them even if travelling alone, though I am not at all fastidious, and can sleep well enough even if the number of fleas exceeds the average; do not examine the bedding microscopically, provided a mountain stream, or lake, or other modification of clean water, is within easy reach on the following morning.

Forbud was absolutely necessary, and I had great difficulty in finding a man at Udvig last night, where the proprietor was absent and the fine ladies were unable to help us.

We start at 6.30 a.m., the first stage being an ascent of the mountain which slopes down to the fjord, by the steepest road, of equal length, now remaining in Norway. The height of the ridge is 2200 feet above the station, and the road is an unsophisticated inclined plane, that proceeds straight up, without any windings or other engineering complications. We were advised to walk,

and followed that advice, for the five horses—all

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we could get—were barely able to drag up our luggage. None but an invalid or a lunatic would attempt to drive up such a goat path.

The weather is wretched, and we lose the splendid views of the Jostedal glaciers which are promised to tourists who climb this hill and proceed to Moldestadt. After topping the ridge, we drive through wild country to Forde without changing horses, and there find the boat with five rowers, as ordered, waiting for us. An old man tells us that another rower is necessary in consequence of the storm, and we agree to the additional cost of his wages. But this is not sufficient, the old man further tells us. At all slow stations there is a special legal fee, called “tilsegelse,” or fetching money. This is perfectly fair, as where horses are not specially kept for travellers, a man may have to climb a mountain, or walk or run some miles to find a horse, and then must chase and catch it. The tilsegelse for each horse is four skillings—not quite twopence ; for fetching a man, two skillings—or rather less than one penny.

The five boatmen stood round, and looked curiously at the old man when he held out his hand for the tilsegelse. I gave it to him, and then a broad grin of satisfaction spread all over his face, and extended to the roots of his hair as he pocketed the penny and told me that the man to be fetched was himself.

I was as much pleased as the old man, an indefinite delay being prevented, and therefore we all laughed heartily together when the conspiracy was revealed.

Tourists who travel by this route, may find in the dagbog at Faleidet some rather severe strictures of mine appended to a complaint made by a preceding tourist, who there states that in the course of the journey we are making to-day, he encountered “three successive attempts at imposition/” This was so contrary to all my own experience in Norway, and that of others who understand the usages of the country, that I ventured to record my conviction that the three successive attempts at imposition were illusions, due to the traveller’s ignorance. This idea was confirmed at every successive stage of our progress over the same ground that the grumbling traveller had previously passed, as the tilsegelse was there demanded in a peculiar and very unusual tone of defiant insistence; and it was demanded in advance, with an evident determination that unless it was paid, the horses and carriages ordered by forbud, and awaiting somewhere hard by, would not be brought forward. When they found that I paid it without hesitation, and added a small trifle as “drikke penge,” their aspect changed, and all was friendship and eagerness to serve us. The sore place left by the stupidity of the previous tourist, was as evident as though it had been a sabre cut, but it was healed at once by an expression of good-will, and the few farthings of drikke penge (drink money).

Even an experienced tourist may be mistaken, unless very careful. Thus at Haugen, the second station from Hellesylt, I thought the station-master was cheating me, but on reference to the dagbog I found that this station, wretched as it is, has the legal status of a “fast” station, quite exceptional hereabouts, and the legal charge for each horse is 1½ mark per mile, instead of 1 mark as from slower “tilsegelse stations.” * Of course the station-master demanded his legal fare, although we had incurred the expense of sending forbud, which is usually unnecessary for fast stations.

On other occasions I found that a distance of

1 mile was charged or even more. To the uninitiated this would appear an obvious imposture, but such was not the case. The rates are regulated according to the work to be done by the horses, and thus an up-hill road is estimated at more than its mere length. There is another possible source of misunderstanding. Town rates for posting are

2 marks per mile, and this is charged at certain town stations, and at others on account of the difficulty of the road.

These modified regulations may appear perplexing, but practically are simple enough, for every station has its dagbog lying conspicuously on a table, wherein each tourist is required to state what horses he has taken and to where. On the cover or first page of this book is an official printed form, with full statement of the special

contract made between this particular station-master and the Government. This includes the number of

* A Norsk mile is equal to a little more than seven English miles, a mark 10trf. Comparing these with our English rates for posting leaves us little reason for grumbling. horses to be kept in readiness each day if a fast station, and the distance and charge to be made to the next station each way. Tims the tourist can verify every item, and also learn how many horses have been taken during the day, a matter of some importance at fast stations, inasmuch as he may thereby discover the true source of unexpected delay and abstain from using any bad language, when he finds that the station-master has sent a long distance for the supplementary horses, which he is not bound to supply at all except as a matter of personal courtesy and good-will; and upon which he usually obtains no profit whatever, as the prices of horses and horse-keep have risen so much of late that he cannot hire from his neighbours at any less than the official rate, which has not risen with this increase of cost.

Tourists should never forget this and their other obligations to the station keepers, and should behave accordingly. This reminder is scarcely necessary to any true gentleman, who proves his quality by treating all his well-conducted fellow creatures with respect, whatever be their station; but unfortunately there still remains among us a foul residuum, a few who have inherited wealth, which they misuse, and the name of Englishmen, which they disgrace; whose blood, and bone, and body and soul are so inherently and incurably vulgar and degraded, that they certify to their own blackguardism by calling their poorer brethren “cads” and otherwise insulting them. These are the social refuse that, as I have already stated, have been occasionally compelled to wheel their own carriages. They afford the only instances in which the ass is used as a beast of burden in Norway. He is entirely superseded for native use by the hardy little Scandinavian pony.

We lose little time in embarking. Although the boat is of good size, the six rowers and seven passengers fill it quite sufficiently. We are huddled in the stern to make room for the oarsmen, and find that the old man was quite right in his demand for more power, as the head wind blows fiercely, in some places almost overpowering the rowers, and throughout compels them to hug the steep rocks of the shore in order to obtain the shelter afforded by its many projecting headlands.

This lake, the Bredhjem's Yand, is very grand and beautiful, and our excursion thereon would have been a delightful one, but that the rain poured down from the clouds above, and the spray blew over from the waves below, rendering umbrellas, waterproofs, and other devices of very small avail. In the course of about four hours we reached the landing place, Förde (in Bredhjem), and there we found the carriages ordered by our forbud messenger all awaiting us. They had been waiting some hours, as the storm had kept us long beyond our appointed time. In such cases “ventepenge,” or waiting money, must be paid, at a rate fixed by law. The regulation allows one hour for waiting without payment of ventepenge, but after this the charge for each horse or boatman is equal to that for a quarter of a mile of posting for every half hour. The postmaster is not bound to wait more than two hours and a half. When this is exceeded and the traveller afterwards arrives, he must pay the ventepenge for the horses that waited, and tilsegelse for fetching them back.

As the rain was still pouring, we “accepted the situation,” and drove through it. We were moderately wet on starting for this stage, but the aspects of exposure being now changed, as we sat in the curious vehicles (there are few carriages hereabouts), an hours drive was sufficient to render the drenching quite complete, and uniform on all sides.

Getting wet is a great deal worse than being wet. Those who have not walked or driven steadily on from morning till night through continuous rain may not understand this, and therefore I will explain. So long as the water is beginning to reach the skin in unconnected patches, just wetting the knees, or the shoulders, finding crevices by which to trickle down the back, &c., a miserable shrinking, writhing, crouching series of sensations are produced, accompanied with futile struggles to escape; but when all the fibres of one's garments are uniformly soaked throughout, and no further downpour can make them any worse, a feeling of resignation supervenes, and a soothing influence is produced by the action of the general poultice which envelopes the whole surface of the body.

Thus we started with some grumbling, followed by general wretchedness, but at the end of this stage we were all laughing at each other's pitiful plight.

The drive from our landing place to the next station, Schey or Ovre Yasenden, is through one of the most magnificent passes in Norway or anywhere else. It is a valley of desolation strewn with the ruins of a shattered world. The road winds amidst immense heaps of broken rocks heaped upon other broken rocks in the wildest confusion ; under the shadow of dark frowning precipices, along blasted shelves overhanging a torrent roaring down innumerable white foam slopes, or sleeping here and there in shady outspread pools of inky blackness ; waterfalls pitching down the rock walls above, and wondrous farmhouses lodged upon ledges between fearful precipices for the harvesting of hay patches appearing no bigger than large tablecloths. The mowers were at work on some of these in spite of all the rain.

The agricultural machinery, the improved seed, new manures, &c., &c., displayed at our cattle shews, have done wonders in developing the productiveness of the soil; but all these combined and many times multiplied are but impotent compared with the results obtainable and obtained by the ancient and simple machinery of peasant proprietorship. If land were held in Norway as it is in aristocratic England, the whole region through which we have passed since leaving Molde would yield no sustenance whatever to human beings ; it would remain a pathless wilderness, still peopled by its aborigines, the bear, the wolf, and, possibly, the northern hyena and the hairy Siberian mammoth. At least three-fourths of the present cultivated area of all Norway would become deserted if its tillage were subject to any system of tenant-at-will serfdom.

This black valley opens out at its upper part into another of greater width, in the midst of a labyrinth of wooded hills backed by the snow mountains of the Jostedal, the largest glacier

region in Europe. These were hidden from us by the bad weather.

In spite of this and all the disadvantages of the pouring rain, the grandeur of this drive was overpowering*. The narrow part of the valley, where the precipice walls were highest and the desolation of the shattered mountain fragments the wildest, might have been a highway to the waters of Lethe, which were not unaptly represented by the first glimpse of the black Jolster Yand as we saw it through the downpour.

The blackness of this and the neighbouring lakes is a curious phenomenon. This subject of the colour of water has been much discussed, and some rather recondite explanations have been offered, especially in connection with the polarization of light.

My own observations have satisfied me that, after deducting the influence of the reflected light of the sky or clouds, the residual special colour is directly due to the minute particles suspended in the water. Pure distilled water is nearly, if not quite, colourless ; so are some lakes and springs. The Aachensee in the Tyrol, and the deep circular well or fountain formed by that very remarkable spring, the outflow of which constitutes the river Anapo near Syracuse, are the two most notable examples of this that I now remember to have seen. The depth at which objects are visible at the bottom of these is marvellous. A plunge from the rocky banks of the Aachensee into its deep water is truly “ a sensational header ; ” it seems a suicidal pitch into mid-air from the edge of a precipice. I had to screw up my courage considerably before making such a dive. Floating in a boat over the fountain of Cyane, the source of the Anapo, and looking down at the pebbles, seen with microscopic distinctness, forty or fifty feet below, was suggestive of sitting in the car of a balloon. Transparency and absence of colour were here combined.

The green Rhine and the blue Rhone are both brilliantly clear; but their outspread waters at Constance and Geneva lack transparency when compared with those I have named. This and their differences of colour are, I believe, simply due to the minute rock particles still suspended in them. The water merely displays the differences in the colour of these particles.

The deepest purple or indigo lakes I have seen are in the neighbourhood of dark slaty rocks, or where gneiss or hornblende material abounds. In limestone districts, especially where the limestone is ochreous, and amidst red

and deep-yellow sandstones,. the waters are green, almost pea-green insome cases. This is the case even with the sea, setting aside the yellow colour of the water that is visibly sandy.

The waves of the Atlantic, where they dash against the dark cliffs of Mohir and Kilkee, and all along the coast of Ireland from Loop Head to Galway Bay, are singularly rich in colour where they break directly on the rocks without any intervening sand.

Instead of being of lighter colour, of a more yellow green near the coast, as we always find it where the shore is of limestone or yellow sand, the water here is perceptibly darker, more deeply indigo in tint, than out at sea. I observed this in the course of a recent visit to the west coast of Ireland, especially during a gale in the neighbourhood of the tortured rocks of Kilkee. This coast water must hold in suspension a vast quantity of dark purple rock particles too small to be separately visible, even with the aid of a microscope, for the waves, in spite of the smoothness due to their fluidity, are scooping out deep caverns and natural bridges, and are perpetually undermining the hard cliffs, and isolating promontories.

In order to effect this every drop of water that splashes on the rock must do its portion of the work. What must be the size of the rock par-tide eadi drop removes? It must be so small as to remain suspended amidst the agitation of the great rolling breakers of the Atlantic swell, and the work done shows how great must be the aggregate of these. Though the water is nowise mudded, but beautifully bright and clear, it is far less transparent than pure water, and coloured as I have stated. The immeasurably fine particles of dark rock must be there ; their colour is there, and it is a fair assumption that the coexistence is due to causation, especially when confirmed by so many other cases.

The most remarkable of these is afforded by the inky, or rather pitchy, blackness of such lakes as the Jolster Yand, the pools of the river, the other lakes hereabouts, and the multitude of similar lakes and pools in the Teilemark, in Scotland, Ireland, and other regions where the waters flow through peat bogs.

Small quantities of such water are brownish ; the shallow torrents appear like rivers of tea, or very clear weak coffee ; but when deep, and especially seen in shade, are as black as pitch. Their colour is, I believe, actually due to a kind of pitch, to the slightly soluble hydrocarbon existing in peat, and easily separable from it by distillation. I have distilled several tons of peat and a few thousand tons of cannel, which is probably a fossil peat. Both yield a brown tar, the colouring basis of which is an asphaltic pitch, a thick lump of which appears black, and just of such blackness as the deep water of the lakes formed by the drainage of peat bogs ; while a thin transparent slice of this pitch transmits the same light-brown colour as a few feet thickness of the lake water.

The reader may easily try an illustrative experiment by dissolving a little pitch in turpentine. A thin layer of this solution has the same colour as the streams that issue from peat bogs; a deep basinful is black, like the contents of the lake basins that are tilled by the peat-bog rivers.

I should add that most of the pitches or tarry hydrocarbons are slightly soluble or diffusible in water, i. e. just sufficiently to give a brown tinge to the water. This colour and that of the peat tar itself is due to the presence of immeasurably small particles of carbon. These are separated by the refiner when he takes out from such dingy tar the beautiful pearly paraffin now so largely used for candles.

The last stage of our drive, after a descent from the wild pass, is along a nearly level road following the bank of this dark lake. I have little doubt

that in fine weather the scenery is very beautiful. The rain continued steadily, but had quite lost its power of annoyance; we now had become so well acclimatized that only its ridiculous aspects were visible.

We passed many fine waterfalls, and I find in my notes especial mention of one that the men who came with us to take back the horses called the “ Ulda Foss.” We saw it just before reaching the Jolster Yand. It resembles the Ruikan Foss, and from the distance appeared as fine, but may not usually have the same magnitude as during this weather.

At last, after about sixteen hours of climbing, driving, and boating in continuous rain, we reach our destination, Nedre Vasenden station, at the lower end of the lake. Solid leather bags and portmanteaus, thick mackintosh coverings, and everything else were wetted through; books, &c., inside did not escape. We could not have halted anywhere nearer for the night, the best of the intermediate stations being Schey or Ovre Vasenden, which is accurately described by Bennett as follows: “No inn, but three fair beds (two with sheets) may be had at the station. Neither food nor spoons.” Tourists on this road should carry food with them on starting. At Nedre Vasenden we were well provided. The large wooden room has one of those admirable Swedish stoves surmounted by an elaborate series of arched cast-iron flues, by means of which the heat of the fire which in England is devoted to warming the clouds, is made available for human comfort. There was no fire there when we arrived, and the room, like ourselves, was very cold, but a few handfuls of pine wood burning in this stove radiated more warmth into the room in ten minutes than could have been obtained in two hours by means of the barbarous cage of iron bars which in England we bury in a hole in the wall, in order to prevent useful radiation; and use for the purpose of wasting coal, manufacturing chilblains, and rendering any rational system of effective ventilation impossible.

We were well satisfied with our quarters here, although there was no gilded drawing-room nor any mahogany furniture. The station is an old-fashioned unsophisticated deal board Norwegian farmhouse of the best class—everything clean and genuine, the food excellent, though unpretending; and above all, richly decorated by that simple welcome which displays itself in the obviously sincere desire to minister to one’s comfort, without striving for additional items to swell the bill. This moral warmth, added to the grateful radiations from the stove, soon banished the disagreeable recollections of the day’s journey, and left us free to recall the magnificence of the scenery through which we had passed. I think we all agreed that it was one of the grandest panoramas we had ever witnessed in the course of a day’s journey. This certainly is my own opinion. A new road is in the course of construction, and I have little doubt that ere long it will take rank among the lions of Norway.

August 22nd.—According to all the canons of good society, six English ladies, after the sixteen hours’ exposure of yesterday, should be confined to their rooms, and utterly prostrated with fearful colds; any approach to getting up to breakfast being utterly impossible and undreamable.

Not so in Norway—not so at Nedre Vasenden; all were up, all well, never better, breakfast in good time. It might have been very different had we commenced our journey hereabouts, as two of the ladies were in delicate health when we left England; such a day as this might then have been too much for them. But after sailing round the North Cape, breathing the bracing air of the Arctic Ocean, and driving over the Dovrefjeld, &c., they were prepared to endure and enjoy an amount of exposure to the elements that would have killed many home-staying delicate ladies. Understanding this beforehand, I had no uneasiness on this matter.

Clothes and portmanteaus were dried, forbad sent on ahead, all mounted and under way at 10.15 a.m.; this late hour being simply due to the heavy nature of the drying business, and the fact that our next destination is but a short day’s drive.

Good road to Forde, but very bad from Forde to Langeland, as steep as the celebrated ascent from Udvig, but not so long. Grand scenery all the way to Sande, which we reach at 6 p.m., wet through again. Waterfalls and torrents too numerous to specify or to bear separate names.

At several places during the last three days I noticed terraces of till topped with what appeared to be a rather deep layer of alluvium.

CHAPTER XV.

Luxury at Sande — The fruit trees of Sande and other parts of Norway — Probable cause of their luxuriance — Fallacies of the sparrow worshippers — Sparrows do not feed on caterpillars, nor tigers on baked potatoes —

Hotel books for tourists' "remarks" — The highest of the mountains near Sande — Curious structure of snow — Trail of wild reindeer — Our bill at Sande — Drinking wine "for the good of the house" — Why should the wine pay for the dinner? — Wines in Norway — The Stolkjærre — The Sognefjord — Coal seams in the course of formation — The probable origin of some of our coal seams — Irregular proceedings and unjust suspicions.

August 23rd, 24th, and 25th.—The praises of Sande had reached us when far away. Bennett describes it as "one of the most comfortable stations in Norway; food and attendance unsurpassed." On the faith of these we resolved to spend the Sunday and make even a further resting halt at this station. Our anticipations, though perilously sanguine, were fully realized, and we join in the general chorus of "Skaal to Siversten and Sande."

The excellence of this station is the more remarkable from the fact that it has no special advantages of position; is not at the mouth of any great valley, nor on a fjord where tourists and yachtsmen must halt, nor near any celebrated salmon river or waterfall, nor on a great highway. Yet somehow it has acquired such a reputation that large numbers of tourists somehow find excuses to stop here and revel in "the fleslipots of Sande," as we did for some days with huge enjoyment.

The cherry pies of Sande, the black-currant tarts of Sande, the red-currant tarts of Sande, the bowls of bilberries of Sande, the wild raspberries of Sande, and the currants of every colour of Sande, all buried in a neve of the rich cream of Sande, to say nothing of the fritters of fish, the stewed ptarmigans, and the delicate, though incomprehensible, little joints of meat, have engraved such deep memories in my heart that I cannot allude to them without emotion, and I am sure that when the glances of my pupils and companions fall upon these pages, their eyes will be moistened as mine are while I write. I say eyes, not mouths, in order to eliminate vulgarity.

After breakfast, and after dinner, and after tea, and after supper, at this latter end of August, we gathered cherries and gooseberries, and black currants, and red currants, and white currants, all growing in such profusion—some not yet ripe—that the household and guests of Sande were unable to consume them. I have never seen in any other country than Norway any approach to these currant bushes. The fruit was growing not merely in bunches, but in great masses of bunches; a large handful might be gathered with a single pull, and these agglomerations were so numerous that the branches were borne down by them, and trailed upon the ground. I counted seventy fine bunches of red currants, growing on six inches of stem. When in Norway before, I noticed the wonderful yield of the cherry trees in this neighbourhood, i. e. at the mouth of the Jostedal, and attributed this redundancy to the regular pruning that must have resulted from the custom I observed at Ronnei, of serving a branch of cherry tree laden with fruit as a dessert and centre ornament of the dinner-table. I resolved to imitate this pretty custom if ever I became the fortunate possessor of a cherry tree in my own garden.

A few years afterwards this vision -was realized as far as the possession of fine cherry trees was concerned, but the dessert was a failure, and this failure suggested another and I believe the true explanation of the wonderful yield of the cherry trees and currant bushes of Norway. If I gathered my ornamental branch of cherry tree when the earliest of the fruit had just ripened, 95 per cent, of the whole were unripe and worthless; if I waited until the majority ripened, the sparrows had carried away all the early fruit. Besides this, the bullfinches and other thick-billed epicures invaded the trees during the early spring, and picked out the delicate heart of the flower bud just as it was opening; strewing the ground under the tree with a snow-like layer of the outer petals.

The currant bushes were stripped as soon as the seeds were developed within the young green currants.

During our stay at Sande, which is situated in a low level, south aspect, richly vegetated district, I looked out carefully for sparrows, but saw none, nor any other of their strong-billed cousins; and to this I attribute the abundance of every kind of fruit which the climate is capable of ripening.

Certain cockney concoctors of newspaper paragraphs have done the considerably indignant in denouncing farmers' clubs and other efforts for the extermination of sparrows and similar agricultural vermin, which in Norway are beneficently starved to death by the long winter.

These natives of Fleet Street and the Strand, W.C., imagine that sparrows eat caterpillars. They might as well

suppose that tigers dine upon baked potatoes. The most rudimentary acquaintance with the subject would have taught them that there are insectivorous birds and gram-nivorous birds, and that the latter are at once distinguishable by the hard, thick bill, of which the sparrow's is a good example.

Even a cockney of the most antiquated Bow-bells type, had he used his observing faculties, might have asked where the multitude of sparrows whose habitat is a London cabstand find their caterpillars or any other creeping food ?

Even among the insectivorous birds there are very few that will eat a caterpillar of any kind, and none at all that will eat a hairy caterpillar. We all know how eagerly domestic fowls devour earth worms. If any of my readers are astonished at the assertion I have put in italics, let them offer a hairy caterpillar to a cock or a hen, or put one in an aviary containing various birds, and watch the result. Even the smooth green caterpillars, although not protected by an acrid secretion or repulsive integument, are evidently insipid, appear to have no more flavour than the leaves upon which they feed, and to contain mere chlorophyll juices in lieu of blood; for domestic fowls and insectivorous birds only eat these when hard pressed for food. Having seen a sheep eat raw mutton chops,* I am not prepared to assert the absolute impossibility of a starved sparrow swallowing a caterpillar, or a tiger eating a baked potato on an emergency; but that such food is unnatural to these animals is unquestionable.

Farmers understand this, and their indiscriminate destruction of small birds is as mythical as the feeding of sparrows upon caterpillars. No farmer or farm labourer wilfully kills a swallow. The nests of these birds are scrupulously respected, simply because the farmer understands their habits, and justly classes them amongst his insectivorous friends. To slay a swallow or a robin is justly regarded as murder and sacrilege, and the old rhyme of " Who killed Cock Robin ? " fairly expresses the popular discriminative estimation of this useful thin-billed bird, as compared with the rural hatred of the thick-billed seed-cracking, pea-shelling, blossom - nipping, cherry-stealing, sparrow. The farmer kills sparrows for the same reason as he kills rats and mice, and our laws prohibiting the use of poisoned wheat for this purpose are as

* I allude to a sheep that was reared from pet lambhood by a butcher in Jernyn Street, and that followed the butcher's men like a dog through the streets of London. The education of this animal had been so perverted that it ate raw mutton and beef—would even steal dainty morsels of its fellow-creatures' ribs when hungry. Absurd as would be an Act of Parliament prohibiting the maintenance of cats and the use of mouse-traps.

The exportation of sparrows to Australia was the culminating folly of the " small bird " worshippers.

At Sande there is a tourists' book, such as we find at most tourist hotels, in which the names and remarks of visitors are entered. These books are usually amusing, but rarely instructive. There was one note by Mr. Sidgwick in this book at Sande that I found suggestive. He describes very clearly a sheltered nook in the river where a most refreshing " header " is obtainable. I followed his directions, and indulged daily during our stay. This bit of information was really valuable, and suggested the proper use of these books at customary halting places. They should be made the medium for communicating local information based on individual experience. In accordance with this, I emulated Mr. Sidgwick by describing in full detail a solitary exploration which I made in search of the highest summit of the neighbourhood.

A repetition of these details would be tedious here ; but as I hope that some of my readers will visit Sande, and enjoy a sojourn there as we did, I O!

mention this entry of mine; it will enable them to make an interesting excursion without any other guide, as there is no danger or difficulty in ascending these glaciated hills. They are, however, somewhat perplexing on account of their mocking: summits.

You start for the highest visible summit, bent upon surveying a panorama of the whole district. You reach it at last, and then discover that the actual summit is a mile farther ahead. You traverse the hollow between and the slope leading to this, then find another still beyond, and another still. In this case, when the highest lump is finally attained, it commands a fine amphitheatre of snow peaks, stretching from north-west to east and south-

east. The Sognefjord is visible at the bottom of a notch to the south, and the sea to the westward, with some remarkable flat-topped precipitous hills or escarpments on the west horizon near the sea, displaying very effective sweeping glaciation; where the glaciers probably terminated by toppling over the precipice into the sea, as at the North Cape and the other Arctic headlands.

I descended on the south-east side down a series of long snow slopes to Bjerkeland, and then returned by road to Sande. I observed a curious

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structure of the snow on these slopes. Its original flaky form had quite disappeared, and it was converted into loose granular layers, consisting of flattened spheres rather larger than mustard seeds, or comparable to small tares or Dari seeds.

The structure of these was similar to that of hailstones, compact ice on the surface of each, with a core of loose snow. This structure is evidently due to a thawing and regelation of individual snowflakes, but in this case the regelation was not accompanied with any welding of the flakes with their surrounding bedfellows, for the mass was quite incoherent, and when handled felt like crystalline sugar. These remarks apply only to the superficial layer of a few inches in depth.

Across one of the patches were the footmarks and droppings of what I suppose to have been a small herd of wild reindeer.

I was disappointed in not being able to see the Jostedal sneefond from this elevation. The snow peaks that I did see on the horizon formed its boundary, but the great glacial plateau was hidden by them. As this *nevé* covers an unbroken area of above 500 square miles, and is the largest glacier in Europe, a good view over it is worth climbing for. My recollections of what I saw of it and of the Stygge Valid from the summit of the pass at the head of the Jostedal * was my chief incentive to this excursion, in which the ladies declined to join. They, however, visited a *saeter* nearer to Sande, and were very much interested with the *saeter* economy. I passed two *saeter* pasturages

August 18th.—We bid farewell to our kind attentive host and his equally attentive assistants, and proceed to Yadheim, one of the ports of the Sognefjord, just two hours' drive from Sande.

Our bill at Sande for all the luxuries and very much laundry amounted to \$34, or 81., including the *pigge* ; seven people, four days. This is rather less than 65. per day for each.

This charge of six marks per day (exclusive of wine, of course) appears to be the common rate at the best Norwegian country stations; those that, like Aak, Faleidet, Sande, &c., have developed into hotels.

As wine-drinking was, with all our seven, a matter of ceremony rather than habit, we drank no wine when thus by ourselves. I mention this, in reference to the foolish, the very reprehensible slavishness, which so often impels Englishmen to order wine at hotels merely to exhibit their own

* See 'Through Norway with a Knapsack,' chaps, xi. and xii.

munificence, or to conciliate the proprietor by swelling the bill.

In some English hotels the guest who drinks no wine is barely treated with civility. I saw one bill of an Edinburgh hotel, where, appended to each charge for dinner, was an item "In lieu of wine, Is. 6c?.," and I grieve to say that the victim who showed it me was weak enough to pay it, although he was charged four shillings and sixpence for his beefsteak dinner, and one shilling for his bottle of ale.

I kept my eyes wide open all through this trip, in order to learn whether the practice of "sticking it on" in the wine, and measuring the moral status of the guest by the quantity of wine he swallows or pays for, has yet found its way into Norway, and have great pleasure in stating that it has not. I sincerely hope that it never will.

By treating this custom as one "more honoured in the breach than the observance," the Norwegians will gain in

the long run, for however unwilling weak-minded people may be to admit it, a vast number, I may say a great majority of those who would otherwise be hotel guests, keep away from such places altogether on this account. They refuse to pay five shillings for an eighteenpenny bottle of Bordeaux, and object to being the sneering-stocks of insolent waiters if they drink beer or water.

The Norwegian practice is to charge the wines at about the same rate of profit as everything else. The Norwegian hotel-keepers sell better claret at half-a-crown per bottle than is obtainable at many English hotels for five shillings. The duty on such wines is now about the same in both countries. The same applies to the sauternes, hocks, and other true wines. Though I have travelled in vine-growing countries, and know something about grape juice, I do not understand the merits of such laboratory products as “tawny port” and “dry sherry,” and therefore cannot compare the Norwegian with the English varieties of these compounds.

The short drive between Sande and Ydheim is through a richly wooded valley, with the parsley-fern growing in great profusion, and the waters of the river tinged with the hydrocarbons of the peat; weak-tea coloured in the shallows, and of inky blackness where it forms small lakes, by filling up the hollows it meets on its way to the long deep notch into which the Sognefjord thrusts an arm. Even the fjord itself is ringed at Ydheim, where the peaty water pours into this narrow notch. The brown tint is just visible against the white stones at the bottom of the shallows near the pier, and increases to blackness as the water deepens. This dark tinge gradually changes to green on passing out of the branch into the main fjord.

There was one feature of our travelling arrangements which prevailed all the way between Hellesylt and Ydheim, that I must not omit to mention, viz. the absence of carriages, and general prevalence of the *stolkjaerre*, i. e. chair car, or chaise, or in pure English, a “one-horse shay.” It is made like the carriage, all of wood, and with similar long shafts. Near to the footboard another pair of shafts is attached to the main shafts; these supernumerary shafts branch obliquely upwards and backwards, at an angle of about 45°, and to their upper end the seat is affixed. It thus rests upon the upper end of a pair of wooden springs. This seat, thus mounted or merely suspended over the axle, with no support immediately below, is simply a board, wide enough for two persons to sit upon, with an open-railed back. The luggage and conductor rest as in the carriage, on the stern ends of the main shafts, which are extended backwards to some distance beyond the back of the seat, for this purpose. Annexed is a portrait of one that carried two of us to Sande, and remained behind conveniently for sketching.

They are very rudely put together, and although we did not grumble at the primitive construction of the vehicles, we were considerably annoyed at another feature of the posting arrangements of this district.

Usually, in Norway, a boy or girl rides behind the carriage—sits or stands on the tourist’s luggage—his or her mission being to bring back the horse and carriage to the station from whence it started.

Hereabouts, i. e. at nearly every station between Hellesylt and the Sognefjord, a full-grown man was perched on the portmanteaus, held on to the back of the chair, and leaned forward, to the considerable annoyance of the ladies, and the overloading of the horse, especially as in every case there was one man to each horse, apparently the owner. At the stations where boys are employed, one will frequently bring back several carriages by driving the foremost, the rest following, either by the intelligence of the horse or the aid of a rope.

It is customary to give “*drikke penge*,” about live or six shillings per stage. As a rule I gave more to boys or girls than to these men, and endeavoured to make them understand that the juvenile attendants were preferred.

The Sognefjord is very fine, but excepting some of its branches—such as the Naerofjord, &c.—it is not equal to the estuary between Aale-sund and Hellesylt. As its main trunk is 120 miles long, and the aggregate length of its branches considerably more than this, it affords, like the Hardangertjord, a splendid region for yachting and boating. It is not necessary to bring yachts or boats from England. All sorts may be found at and near Bergen. This great estuary, like the Storfjord and its branches, is continually receiving avalanches of trees from its steep sloping sides, which are all more or less wooded. We saw the tracks of many of these as we steamed along, some

quite recent, where the 314 TnROUGH NOR

rocks were bare throughout the course, others in various stages of re-vegetation.

What must be the effect of this if continued for ages, for the whole of a geological period ?

A little reflection will enable us to answer this question. These avalanches consist of trees and fragments of rock and soil.

It is evident that the stones and all such dense material will sink to the bottom at once, and rest at the foot of the slope like an ordinary subaerial talus ; but not so the trees. They will float for a while; the impetus of their fall must launch them forward towards the middle of the estuary, where they will spread about, and ultimately, as they become saturated, they will sink, and thus will be pretty generally distributed on the bottom, and mostly at that portion of the bottom which is beyond the reach of the stony and earthy debris. Thus in the clear-water fjords extending far beyond the muddy mouths of rivers, these trees will form the sole deposit, minus the very small subsidence due to the infinitesimal small particles that give the colour to clear water.

Here, then, we have a coal formation, or, more strictly speaking, a lignite formation, in actual progress, and one which I think is very instructive in connection with the much-debated subject of the mode of formation of coal seams.

I have already referred to the exceptional transparency of the water of the Aachensee, a lake in the Tyrol, situated about thirty miles to the north-east of Innsbruck. When there in 1855 I was much interested in observing hundreds of trees lying down, standing upright, and leaning at various angles, at the bottom of its colourless and transparent water. I bathed in the lake, swam out and dived down, brought up several pieces of wood in various stages of decomposition, the annual rings being' curiously separable by the ready decomposition of the cambium layer between them. On the slopes of the lake were the tracks of tree avalanches, like those here on the Sognefjord. I read a paper on the subject at the British Association,* which was followed by a very interesting discussion, in which Sir Charles Lyell, Sir Roderick Murchison, Professor Phillips, Principal Dawson, and other eminent geologists took part.

Subsequent observation has confirmed my opinion there expressed, that some of our coal seams may have thus been formed ; I do not say all, being quite satisfied, from the variations in the composition and structure of different coal seams, that no single mode of formation is common to all.

We steam along the Sognefjord and its

* See Report for 1864, p. 78.

branches from 12.30 p.m. on 26th August, until 3.30 a.m. on 27th, and then land at Laerdal-soren.

After breakfasting at an hotel of some pretensions, we start at about 5.30 with horses and carriages hired from men who offer them on the pier when we land. I had some hesitation in perpetrating this irregularity, but was practically compelled to do so by the irregularity of the circumstances.

A large number of passengers landed besides ourselves, all bound for the Fillefjelde, all in a hurry, all scrambling for horses and vehicles. It soon became evident that the ordinary resources of the station keepers were utterly incompetent to supply the demand, and that these outside touting carmen were genuine benefactors, provided they would behave fairly. Their appearance and manner were not very promising; they had a most disagreeable resemblance to the class of men who infest the landing places of so many countries, and prey upon the helpless foreigners who fall into their clutches. I quite expected some disagreeable experiences that might have given a colourable justification to the accusation of partiality to Norwegians which has been brought against me. This apprehension was increased by the fact that the only case of such extortion which I experienced during my former journey was on the opposite side of this same Sognefjord, where I had something approaching a serious conflict with the drunken boatmen of Sogndalsfjoeren.

Therefore I commenced my negotiations with these rough-looking fellows rather severely; but when they saw that I carried a copy of Bennett, they referred to it at once, and assured me that their charges would be simply those therein stated as the legal fares. Therefore I arranged for a full cavalcade to start in the course of two hours.

Before we had finished our breakfast the rest of the tourists had cleared out, and were on the road; our men and all horses and vehicles had also disappeared, and as these men were not responsible or licensed in any way, I thought we were left in the lurch, that they had taken other “fares” that were less exacting than I had been in the matter of legal mileage rates.

In this, however, I was mistaken; for at the appointed time they came with fair vehicles and *excellent* horses, to the full extent of our requirements.

CHAPTER XVI.

Start for the Fillefjeld — The old road — Borgund Church and its probable origin — Hiring of carriages — Good stations — Glacier débris on the Fillefjeld — Causes of glacial epochs — Descend the Fillefjeld — Good horses and a good caterer — The Vangs Mjosen — Succeeding lakes — Possibility of making a canal highway — A difficulty at last — A long walk on a dark night by unprotected females in a strange country — Hanging on behind — A dog with a bad name — Wild strawberries and raspberries on the roadside — The Etna and Baegna valleys — Pine forests and their reputed curative agency.

We drive through wild scenery with black precipices, ruins of broken rocks, waterfalls, &c., passing Blaaflatten and Husum stations without changing horses; much interested in contemplating the old road, which was even steeper than that by which we mounted the ridge above Ulvik. At Husum we left our carriages and walked by a part of the old road to the old church at Borgund; sending our carriages round by the new road. I recommend all tourists to do the same; no time is lost, the old road being much shorter, and its ascent commands some very fine views. Generally speaking, wherever these old steep roads exist (and they are very abundant now that so many fine new roads are made), it is desirable to walk by them, the exceptions being where the engineering; of the new road is in itself a matter of interest.

Of course we visited the queer old wooden toy church of Borgund, with its nave 39 feet long, and Church of Borgund.

its incomprehensible surrounding narrow passage. Wooden beams, wooden walls, wooden tiles— wooden throughout, This and its twin sister at Hitterdal, near Kongsberg, are about the oddest specimens of ecclesiastical architecture in existence. If they existed alone, with no other remains to indicate the former dimensions of the people of the district, an archaeologist might fairly infer that their average height was about 36 inches. For such a race of pigmies this church of Borgund would be quite suitable, and in fair proportion. A third church of the same kind existed at Wang, near Trondhjem. King William IV., of Prussia, took a fancy to it, had it packed up and sent by “ parcels delivery ” to the Riesengebirge, where it is put together again, like a toy puzzle. The engraving is a correct representation of this architectural oddity. Its origin appears to be unrecorded. Murray says that it “ seems to have been built in the eleventh or twelfth century,” and describes its architecture as “German Romanesque.” If I were a bold theorist I should say that once upon a time, and in those old times when the sturdy craft of the sea kings crossed the Atlantic, cruised throughout the Mediterranean, rounded the Cape of Good Hope, and in fact went wherever there was water to float them ; an adventurous Viking who had been cruising on the coasts of the China Sea, and collecting pigtailed for a local Scandinavian museum, proceeded northwards, till he landed at Jeddo, and there captured a Japanese architect, whom, he afterwards employed to build a church for the amusement of his children.

We drive on again through scenery of continuous magnificence to Maristuen, where we dine and rest for two

hours, and finally reach Nystuen with the same horses—distant about forty-eight English miles from our starting place, with hilly but well-made road throughout. This of course saved us much of our customary trouble of strapping and unstrapping luggage, though we stopped about half an hour at each station to rest the horses, besides the dinner halt of two hours.

It would be a considerable improvement in Norwegian travelling if the stages could be made longer, or some arrangements devised by which carriages could be hired for longer distances, and only the horses changed at each station. I tried to make such an arrangement at Stören for carriages right through to the end of the Romsdal, or to Dombaas where the Dovrefjeld Romsdal road branches from that of the Dovrefjeld; and tried again here for the Fillefjeld, but in vain. The people on the spot have no idea of how to carry out such an arrangement; though it is sometimes done through Mr. Bennett and the Christiania Carriage Company. From what I learned on the way it does not appear to be very successful; there is practically but little choice between buying a carriage or hiring it for the whole of one's journey, and therefore carrying it across and along the fjords, &c., &c., or going on from hand to hand as we did. The only exception to this is in starting from Christiania, where a carriage may be taken for a given journey, and sent back somehow, but the how appears to be rather uncertain.

Good accommodation is obtainable on most of the stations of the Fillefjeld. The beefsteaks, before described, largely prevail. Good coffee everywhere, variable butter, always genuine, but frequently flavoured with strange herbs and flowers that grow with the wild mountain grass.

A legend is still extant which asserts that Barclay's XXX may be had at Maristuen.

We passed many terraces of boulder clay topped with alluvial deposit, their structure being shown in some cases very distinctly by the section made by the present river. This was especially the case near Blaaflaten station.

Nystuen, our resting place, is at the summit of the Fillefjeld, about 3300 feet above the sea level. This fjeld is altogether much finer than the Dovrefjeld, is well worthy of a visit for its own sake, irrespective of its usefulness as a highway between Christiania and the Hardanger, as well as to and from the grand region we have just traversed.

Like the Dovrefjeld, it is covered with the debris of dying glaciers, but the blocks here are much larger. The plateau of this fjeld is not nearly so extensive as the Dovrefjeld; and thus the slopes of the surrounding mountains, besides being steeper, pour down more directly upon it, and have left their deposits accordingly. Long ridges rise immediately from it not far from the road, and some remarkably fine specimens of perched blocks are to be seen in driving over it. Many of these, nearly as large as saeter huts, are visually projected against the sky, and appear so delicately poised that one might suppose that a gale of wind would topple them down. But many a yelling hurricane has screamed across these ridges since they were left behind by the melting ice, and there they still remain upon their pedestals, defying all the storms that yet may blow during the next ten thousand years; at the end of which period the earth's orbit will have made another half turn, and then we shall be nearest to the sun at the midsummer of our northern hemisphere, and the earth will travel over its half circuit most rapidly during our summer time, and thus afford the southern hemisphere the longer summer and shorter winter that we now enjoy. Then will the ice revisit Scandinavia, the great glaciers creep over all its hills and valleys as of old, picking up these blocks that were left behind some twenty thousand years before to carry them we know not whither.

Nothing more is needed for all this than a simple interchange between the climates of the two halves of the world. No shifting of the earth's axis, no extreme convulsion, is demanded; for if under the present distribution of terrestrial climate, the southern hemisphere had as much land around its poles as the northern hemisphere now has, it would be glaciated from the South Pole down to the latitude corresponding to that of London.

As it is, in spite of the great advantage possessed by the southern hemisphere in its vast circumpolar ocean, extending with only a few dots of land between its poles and its tropics, it is utterly icebound and inaccessible to human footsteps, at latitudes corresponding to this Fillefjeld.

Notwithstanding my profound respect for the laborious researches and philosophic reasonings of such noble students of creation as Sir Charles Lyell, Mr. Croll, the two Geikies, Ac., Ac., Ac., I cannot refrain from throwing one little tenderly barbed shaft of criticism against each of their speculations concerning the cause of the many glacial epochs, and intermittent warm climate periods, which modern geology has revealed. I do think that even they have been for the most part rather narrow, in each standing forward as an advocate of one or one other of the possible causes of these changes.

Thus Lyell contends that they are due to variations in the distribution of land and water. Croll and Greikie invoke very great, and rather questionable, alterations in the ellipticity of the earth's orbit; while each refutes the other, by pointing out the insufficiency of mere variations of surface, on one side, and the questionable astronomy of the other. Others again demand disturbances of the earth's axis, and even more violent changes than this.

It appears to me, that if we simply add the changes of climate which, as Lyell has shown, must of necessity result from variations in the distribution of land and water, to the similar changes which must follow as necessary results of the known and demonstrable secular variations of the earth's orbit, we shall have in this combination an agency of sufficient energy to explain all the known phenomena.³²⁶ TEE 0 UGH NOE WA Y WITH LA DIES.

Thus, if the present distribution of land around the North Pole and in the north temperate zones were co-existent with the present astronomical conditions of the southern hemisphere, the whole of northern Europe, of the north of America, and the north of Asia, would be as completely glaciated as it was during the greatest of the tertiary great ice ages—when the moraines were formed upon which the cedars of Lebanon are growing, and when the great table-land deserts of Gobi and Shamo were covered with a Mediterranean sea, that has left its salt upon them, and thus sowed them with their present desolation.

With a circumpolar ocean to receive the glacial outflow and limit its extension by the circulation of its waters—the cold water descending and flowing southwards, while an upper warmer current brought the heat of the south to thaw the ice-wall barrier—the northern hemisphere under the coldest astronomical conditions would have a milder glacier epoch, such as that which evidently succeeded the more severe one, and which probably corresponded with the formation of the little glacier farms I have described, on the northern coast of Norway.

August 28th.—We now descend the Fillefjeld, still with the same horses, men, and boys, to Skogstadt. The two boys, with their horses, return, and we go on with the others to Thune; this latter stage is by a road skirting the Yangs Mjosen, a beautiful lake.

When settling with the men who brought us so far, I found, upon making a calculation for all the stages, that the sum demanded was strictly correct; and therefore I had much pleasure in writing a testimonial in favour of the captain or contractor for the whole cavalcade. He proved to be a very civil and intelligent man. His name is Andreas 'Andersen, of Tonjum; he was then learning English, and greedily picking up every fresh word he could find. The ladies were so well pleased with his civility, and his desire for improvement, that on reaching Christiania, they purchased and forwarded to him an English and Norsk Dictionary, which they knew would be a most acceptable present. I hope that this mention may be of service to him, as he fairly deserves our hearty recommendation to other English tourists.

While on this subject I should, however, explain that this innovation upon the regular system of hiring horses is not without objection. Under ordinary circumstances, when there is no undue pressure (such as we experienced at Lierdalsoren), it is scarcely fair to the station-masters who contract with the Government to keep horses in readiness for travellers. When, however, such excessive demand does arise—as must usually be the case on the arrival of the packet, no injury is done to station-masters, seeing that these outsiders merely carry off the overflow of tourists, whose demand would otherwise be very embarrassing.

This may account for the fact that, with one exception, our irregulars appeared to be on very good terms with the bonders who own the stations. The one exception merely amounted to a mild remonstrance addressed to myself,

but not pressed at all, when the circumstances of our engagement of these supernumeraries was explained by Andreas.

In a country like Norway, where the tourist comes upon the country people just in the midst of their busiest harvest time, receives from them so much genuine, though not obsequious, attention and kindness, and is dealt with so honestly, it is the duty of every traveller to reciprocate by avoiding any avoidable breach of customary regulations, or any course of conduct that maybe unnecessarily inconvenient to the good people he is visiting. He should regard himself as their guest, and treat them with the consideration that is due to a

host who entertains him. This will carry him smoothly throughout Norway, will be far more effectual here than any amount of money bak-sehish, very little of which is needed in this rather exceptional country.

The chain of lakes succeeding the Tangs Mjosen is also very beautiful, and this kind of scenery is the better appreciated on account of its contrast with the desolate grandeur that prevails in the region through which we had previously passed. It appears to me that all these lakes might be connected, with the aid of a few locks, to form a navigable canal, like the Caledonian Canal, and thus form a highway that would cost less than the new road now in course of construction.

We reach Reien station rather later than our usual halting time, and determine not to stop there, as the station and its master have managed to acquire a prominently bad reputation.

On our arrival a woman who is in the house tells us that we can have one horse "strax," that is, at once, and three more in the course of two hours. We therefore decide that one of the ladies shall drive on with the strax horse to the next station, and order dinner, the rest dividing: into two sections, one to walk on about halfway until

overtaken by those who have waited for the horses, with whom they would then change places; myself remaining to the last in case of difficulty in getting horses. We had done this on other occasions, sometimes from choice, when a walk was desirable; at other times when there was difficulty and delay in obtaining full supply of horses and vehicles. The distance of the next station in this case is eight English miles.

We had hardly settled this when the master, so celebrated for his surliness, arrived, and speedily gave us a specimen of his disposition. After arguing with the woman for a while, he came to us and told us, first, that he had no horses, and afterwards that we might have one horse "strax" for \$1 (i. e. more than double the legal fare) to the next station, intimating, at the same time, that we could stay here for the night. We had heard so bad an account of the accommodation that we resolved not to do this on any account, and the ladies all agreed to walk on, I remaining behind in charge of the luggage, either to bring it forward that night or next morning, as could be done.

There is a large farm about half a mile distant, and I applied there for horses with which to overtake the pedestrians and carry them on; but the

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The Baegnedal in Moonlight.

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master of the house was away, and his daughters, who speak English very well, could not let me have any.

I therefore return, refer to the day-book, and finding that the full contract number of horses has already been sent out from the station, submit to the extortion of double fare, and accept the one horse and a wretched ar^beitekjaerre, i. e. the lower frame of a stolckjaerre (see page 312), with a tray laid upon it instead of the perched chair. On

this I manage to pile the luggage, and by means .

of a very imperfect supply of cordage to hold it there in a condition of unstable equilibrium.

All this occupied a considerable length of time ; but finally I started, with a boy perched on the top of the luggage, and myself holding on to the tail of the contrivance, and running behind as naughty little boys run behind four-wheelers in England when the driver cannot see them. This was rendered necessary by the instability of the smaller items of luggage, which I had to pick up and replace as they fell down on the road.

It was half-past eleven when I reached Lille-strand; the ladies had already arrived, and were just finishing their late dinner. They had done a fair amount of walking before starting“ on this

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moonlight stage of eight miles, on an unknown

road in a strange country, but were all i spirits nevertheless, and much amused at the boy's pantomimic description of my bolding on and running behind the arbeitkjaerre.

In reference to the surly man at Reien, I should add that just before starting, i. e. after I agreed to pay the dollar, he melted considerably, attempted to smile, but it was a ghastly convulsive failure; and then begged me to inspect his bedrooms, which rather surprised me after what I had heard of the dirt and the fleas of this establishment.

They were newly furnished, recently scrubbed, much varnished and decorated, with a considerable acreage of white lace curtains, but they appeared very desolate nevertheless. It was evident that nobody had used them, their obviously dyspeptic proprietor holding the unfortunate position of the proverbial dog with a bad name; and it was also evident that his constitutional sourness was further acidified by this unrequited effort. He dolefully regarded all tourists as insatiably exacting and inconsistent grumblers, who slept in his house and abused it while it was snug and dirty, and now refuse to enter it after he has sunk all his capital in bed furniture, curtains, varnish, and soap.

Though very savage with him, I could not repress a touch of pity when he pointed to those carefully tucked up snow-white beds, and with the melancholy air of an injured martyr, which admirably suited his vinegar visage, asked me why we refused to stop in his house.

On reaching Christiania I told Mr. Bennett of these new bedrooms, in order that this knight of the rueful countenance might have the credit due to his efforts, and then found that Bennett already had made a note to this effect, founded on the report of a previous tourist.

It is recorded that an Englishman was assaulted

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here, and had to apply to the Lensmand or police-officer of the district. Mr. Bennett has the following note* in reference to this :

“ An English gentleman, who knows the neighbourhood well, remarks, ‘ If an Englishman was assaulted at Reien or anywhere else (as happened at Fryderlund last year, 1875), he probably had his own offensive manners to thank for it. The man at Reien happens to be a surly kind of fellow, but Englishmen ought to understand that, as a rule, station holders are independent yeomen, who will not stand being ordered about with an Englishman's insolent assumption of superiority over all the rest of the world.’ ”

August 29th.—A new road commences at a

* * Handbook for 1876,' p. 74. short, distance before reaching Lillestrand, and continues onward, mounting the hill-side tby splendid engineering terraces. The views along the very extensive and richly wooded valley, with winding river below, breaking here and there into shining lakes, is extremely beautiful. We seem to have made a bound of a dozen degrees southward since yesterday, so luxuriant is the vegetation, so mild the climate, and so rich is the whole appearance of the country.

We make several halts to gather the wild raspberries and strawberries that grow in curious luxuriance on the steep wooded slopes at the roadside. They are the finest wild raspberries I have ever gathered. The whole of the drive from Lillestrand to Tomlevolden, where we halt for dinner—about thirty-three miles—combines all the elements of beauty that can be afforded by an extensive valley winding amongst rocks, woods, water, rich pastures and snug cottages, skirted by a magnificent road, commanding splendid and varied views of the whole. The highest part of the road, where a gallery cuts through the hill separating the Etna from the Baegna valley, is especially fine on both sides. The road passes over some large moraine heaps, and near Tomle-voden through a fine specimen of a Norwegian pine forest.

The resinous odour of this forest was very remarkable, and I suspect that there is some foundation for the popular belief that breathing the air of pine forests has a curative influence on cases of hooping cough, bronchitis, and similar diseases. It is certainly remarkable that the air of gasworks should be credited with the same influence, seeing that the believers in both of these remedies are ignorant of the fact that they agree in being largely charged with hydrocarbon vapours, and that such hydrocarbon vapours have remarkable powers of destroying bacteria, fungus germs, and the other microscopic organisms with which our profoundest investigators are now nearly unanimous in connecting so many diseases. I find in my diary a query suggested by the odour of this forest, which at the time I intended to investigate, but have since forgotten it, viz. whether there is any special development of ozone in the midst of such woods. We know that some hydrocarbons have the power of ozonizing the air after the manner of a stick of phosphorus, and the ozonelike character of this pine-wood odour suggested the possibility of such action proceeding here. We are now, as usual with everybody towards the end of a journey, hurrying against time, and consequently we arrive late at Skoen after two hours' moonlight drive. This is a good station, almost an hotel.

The Etnedal in Moonlight.

CHAPTER XVII.

The Randsfjord — The corruptions of civilization — A mining and timber district — Norwegian roughs — Drammen and drunkenness — Christiania — Magnitude of our exploit — My theory of our exemption from mishaps — The home sympathy of Englishmen with Norway — Limit of numbers in Norwegian travelling parties — How to obtain the highest degree of enjoyment and advantage in overland Norwegian travelling — Glaciation again — Gottenburg and London.

August 30th.—A half hour's drive after an early breakfast brings us to Odnæs, the northern port of the Randsfjord, on which we embark by the little steam-packet which navigates its whole length (about forty-six miles), in communication with the railway at the other end.

This lake is not unlike Windermere. We dine at an hotel near the Randsfjord railway station, and now, on taking tickets and resigning all luggage responsibilities by the easy device of consigning everything to the charge of a railway porter, I seem to have fully re-entered the regions of prosaic ordinary civilization, where human helplessness may be readily developed into absolute imbecility, provided its victim is supplied with sufficient money for the perpetration of this popular process of moral suicide.

We book to Drammen, and start in one of those open second-class carriages that we found so enjoyable between Trondhjem and Stören, but before proceeding far were glad to make our escape into a first-class carriage. This expulsion was due to the wretched Norwegian habit of spitting, which had been a source of considerable annoyance at many other parts of our journey, but reached its climax here. American spitting may be as detestable as commonly represented, but the Americans are good marksmen. The Norwegians, although their nasal and guttural prelude is sufficiently pretentious to inaugurate a mighty effort, are miserably unskilful and random, and thus in a crowded railway carriage they may become an intolerable nuisance, especially to ladies.

This being Sunday, and the railway running through the midst of the mining and timberloading district, where, even in Norway, a considerable population of “roughs” have collected, and where hard drinking is exceptionally prevalent, our fellow passengers in the second-class carriage were very different from the simple but dignified bonder and his housemen of agricultural Norway. Norwegian Saw Mills. The terraces are very abundant hereabouts, the valley through which the railway winds being paved with a deposit of boulder clay through which the river has subsequently cut a channel.

The river itself (the Dramselv) is of considerable width and makes many cascades; it is also paved, but with different material—with timber loo's of

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all sorts and sizes, so abundant in many places that the water is scarcely visible; all proceeding on their way to Drammen, the great timber port of Norway, with about 17,000 inhabitants.

The timber is cut from the hill-sides of the upper valleys, and floated down to rude waterpower saw mills, like those represented in the engraving, and which are so abundant that they form quite a characteristic feature of Norwegian inland scenery. The sawed timber is then marked and floated on to its destination, which, however, it does not reach without adventure. It pitches down cascades, the long planks presenting a very grotesque appearance when they turn over end foremost, and project like huge bristles from the water as they descend. They are frequently stranded on shallows, from which they are relaunched by men employed for this purpose.

I have one word to say respecting Drammen, suggested by a letter which appeared in the 4 Scotsman ' after I had been lecturing¹ on Norway in Edinburgh. The writer sought to refute my statements respecting the general sobriety and orderly conduct of the Norwegians by describing what he had seen in the vicinity of the town of

----- (why he feared to name the town I cannot

tell). The context showed clearly that 44 -----”

stood for Drammen. There are many others who, being engaged in the timber trade, are well acquainted with this town, but with no other part of Norway. Nothing could be more delusive than to take Drammen as a sample of Norway. Its population consists of all nationalities, and quite a special and exceptional set of Norwegians engaged in the timber trade and the neighbouring mining districts. A Frenchman who should describe the 44 bargees” and coal-whippers of Millbank, and the miners and jDuddlers of Tipton and Dudley Port, as specimens of average Englishmen, would represent us about as fairly as the timber-trade correspondent of the 4 Scotsman ' who selected Drammen to represent Norway.

We reach Christiania at a late hour, and find the Victoria Hotel filled to overflowing, in spite of its considerable extensions and its annexation of the Hôtel du Nord since my last visit.

August 3Lsi.—We 44 do” Oscar’s Hall and the other chief lions of Christiania, not forgetting a visit and revisit to Mr. Bennett, whose bazaar of national productions vigorously aroused the long dormant shopping propensities of the ladies.

Mr. Bennett told me that my first pedestrian wanderings, without guide or companion, over some of the wildest parts of Norway, are regarded as very adventurous exploits by most Norwegian tourists; but in his opinion this journey with six ladies, all carried through without mishap or any serious inconvenience, entirely eclipses the knapsack tour. When he learned that during* the last four weeks we had driven about two hundred and fifty strange horses and an equal number of strange vehicles, the nature of which and their appliances he well understands, and had not broken a single shaft, or lost a wheel, or grazed a knee, or crashed against a boulder, or had any spill of any kind, his surprise, based upon much experience and many doleful stories of tourist carriage adventures, was still greater.

My own theory of our exemption from the customary mishaps of carriage travelling is that the unostentatious—the diffident and concealed, but genuine politeness and true gallantry of the Norwegian character was the

invisible guardian that followed us throughout, and warded every avoid-able danger. The rough peasant proprietors and their housemen at the stations, seeing so many ladies, were scrupulously careful to test every bit of rope, secure every knot, examine every shaft, grease every axle, and do all they could to ensure our safety and comfort.

It may even be that one of the annoyances of which we complained at the time, viz. the sending of men instead of boys to bring back the horses, was due to their anxiety to secure efficient aid and protection ; but be that as it may, I cannot conclude this portion of my narrative without heartily thanking them all, and expressing the feeling that I believe is shared by almost every visitor to Norway, and especially those who have visited it more than once—a feeling of home sympathy such as no other foreign country than “ gammle Norge ” can awaken in the breast of Englishmen; and the common desire to find another opportunity of revisiting a country whose magnificent physical features appeal so powerfully to the senses of the traveller; but not more powerfully than do the honesty and simple goodness of the people appeal to his affections and moral sympathies.

Before concluding, I may add a few practical hints suggested by my experience of the two contrasted modes of inland travelling in Norway; that of solitary pedestrian roughing it, as I did at first, and that of carriage travelling with a large party, as described in the preceding chapters.

In the first place, I advise all who desire to combine comfort with expedition to limit the number of their party. Three or four will get along far better in all respects than six or seven. I have already (page 243) stated the precautions I had to observe, especially the early halting, in order to obtain sleeping accommodation for so large a party as ours. If any larger party should be organized, it must be divided into small detachments, or the inconvenience would be insufferable. Anything like the great crowds which Mr. Cook so skilfully conducts through other continental countries are utterly impracticable in Norway, unless limited to coasting excursion in a large steam yacht specially chartered for this purpose. Such an excursion might, if properly managed, be made very enjoyable, as the best scenery of Norway is on the fjords, and near the coast.

I have now to communicate a great invention, which, with my characteristic generosity and modesty, I have not patented, but offer freely for the benefit of all holiday-making humanity. It is nothing less than a new method of travelling, which combines the advantages of walking and driving, and is especially applicable to Norway.

As a first case, let us suppose that there are two travellers, A and B, who, on a given morning, are at a town or station x, and wish to proceed onwards to y, z, and other unknown regions. A starts off on foot immediately after breakfast, or before, if so disposed. B remains behind, pays the bill, looks up the luggage, takes a carriage, and drives on. By about the time he has completed half a stage, he overtakes A. A and B then change places. B walks on, and A drives forward to station y, where he leaves the horse and carriage he has driven, and orders another for station 2-, to be in readiness for his friend who is coming. The boy in attendance, who has to take back the horse and carriage to station x, and who has witnessed the manoeuvre, will assist in explaining if A is weak in Norsk. A then walks on, and by the time B reaches the station the carriage will be ready. He straps on the luggage, drives on to overtake A as A overtook him before; they thus proceed from stage to stage, alternately walking and driving, the pedestrian part being done without carrying any luggage. If they dine in the middle of the day, a little variation will then occur. The driver ahead will order dinner, which will be ready when the pedestrian arrives, and both will dine together and compare notes. The same at supper time.

The disadvantage of this is the solitude, which to some people is rather oppressive; but this may be partly obviated if the party consists of three, A, B, and C. In this case A and B should start together after breakfast to walk, and C should follow in a single carriage, and, when he overtakes them, A or B mounts the carriage, drives on, orders a double carriage at next station, and then walks forward. In this manner the walking and driving may be equally divided if the carriage is made to carry one person over one stage, and two over the other. Or if only one always drives, the walking for each will amount to two-thirds of the whole distance covered. Or if two always drive, only one-third of the journey will be done on foot by each. In this case two single carriages should be taken in fairness to the horses, seeing that the luggage of three persons has to be carried. Sometimes,

however, even in this case, the double carriage will be found practically the most advantageous; this happens when the station-master has sent out all his fast ponies, and has only one stronghorse at hand. Leave this to the station-master; there is but little difference in expense, as the double carriage is charged as one and a half.

In any case the luggage should be reduced to a minimum, and carried in a box not exceeding 34 inches long, 15 broad, and 11 or 12 inches high, outside measure. This is the limit of size that may be conveniently strapped on the luggage board of a carriage. A wooden box is the best. A good portmanteau is soon spoiled by the nailed boots of the boy or man who stands on it. Carriage boxes with straps complete may be bought or hired from Mr. Bennett, at Christiania.

With a party of four, which is the best number, the walking and driving may be equally divided, as in the case of only two, but with companionship throughout. Or if there is an inequality of walking power, the stronger pedestrians may relieve the weaker by doing an extra stage. This can be easily arranged, especially at the dinner-halt.

I tried this alternation of driving and walking occasionally with my pupils, and found it most enjoyable. The carriage system of Norway affords especial facilities for carrying it out systematically. In flunkyridden countries infested with crawling parasites, who measure a man's dignity according to the quantity of money he expends, this sort of travelling would be hampered by the resistance of postmasters, ostlers, waiters, &c., who would put all kinds of obstacles in the way, on the supposition that the travellers were adopting it in order to save expense; economy and meanness being synonymous in the estimation of such creatures. But in Norway the country innkeepers or postmasters, and their servants are not flunkies, but gentlemen, and consequently are incapable of apportioning their civilities to their guests according to the length of the bill. It would not make the slightest difference to their conduct or their estimation of your dignity, whether they knew that you adopted my ride-and-tie system from motives of economy, or purely for the sake of its other advantages. With them, as with all who are capable of thinking soundly, economy, when carried out by means of self-denial, is estimated as one of the highest of human virtues.

If you treat his horses kindly, do not overload or overdrive them, and pay him fairly for what you have, the Norwegian bonder will cheerfully cooperate with you in carrying out this or any other legitimate means you may adopt for reducing your travelling expenses.

Taking everything into consideration, I have no hesitation in stating dogmatically that Ride and Tie* is the best system of inland travelling in Norway.

Only those who have tried it can fairly appreciate the refreshing influence of the change between walking and driving when thus carried out systematically; both walking and driving become positively and permanently luxurious. The bracing and healthful influence of travelling is brought to its maximum by this change of action and the continuous activity without fatigue.

I recommend it even to the sturdiest pedestrians, provided they reduce their luggage to one box for three, and walk on the two-thirds principle above described.

On the two-thirds afoot arrangement, if each walks 20 miles, the rate of progress will be 30 miles per day, or by walking 30 miles, 45 miles will be done.

In like manner on the half-and-half system with two or four, 20 miles walking gives 40 miles progress, and so on. Or one-third afoot gives 45 miles daily progress with 15 miles walking.

* I am bound to add that my invention, great as it is in application, is not absolutely original. It was first practised by two country boys in England making a journey with one donkey. The first rode on half-way, tied the donkey to a gate to await the arrival of the pedestrian, who then rode on and overtook his companion. Hence "ride and tie." Allowing for stoppages, the ordinary rate of carriage progress is about four miles per hour. Thus 48 miles is a good day's journey. This was my own independent estimate, afterwards confirmed by one of the clergymen who officiated at the service we attended at Bergen. He had a fair opportunity of testing this severely, as, on a

previous visit, he and his friend Mr. Girdlestone had volunteered to conduct a similar service at Christiania on their way home from an excursion inland, and at last were compelled to post continuously day and night in order to get over the last 200 miles, and fulfil their engagement. Travelling thus, and hurrying to the utmost, the 200 miles was barely done within 48 hours.

The low rate is of course due to stoppages. The ordinary pace of the horses, taking the average of up hill, down hill, and levels, is about six miles per hour. The average length of each stage is rather more than eight miles, and the average stoppage at each station exceeds half an hour, this including the dinner-halt. By the ride-and-tie system I propose this waiting time is spent afoot, and the general rate of progress about the same as that of the ordinary carriage driving.

September 1st.—The end of our holiday is now approaching, and the working time for both pupils and teachers will soon commence. We therefore take the first available means of reaching England via Gottenburg, rather than wait for the 'Angelo.'

The general growth of wealth and luxury, and the other changes that have come upon Christiania since my first visit, are described in chapter i. of the new edition of 'Through Norway with a Knapsack.'

The rocky islands of the Christiania fjord are glaciated like those farther north. It has evidently been the bed of a huge glacier formed by the confluence of several glaciers that have swept down the valley of the Glommen, over the Mjosen lake and the Randsfjord, and from the minor valleys westward. According to my view of the ancient glaciation, these great confluent glaciers terminated in a floating ice-wall, stretching and thinning out in the sea, and all the outer portion of this *mer de glace* must have been floated by the water, or resting but lightly on the bottom, where it deposited more or less of its solid burthen. Further inland it must have rested with its whole weight and greater thickness upon the rocks.

The relative depths of the Christiania fjord and the Mjosen lake accord with this. The bottom of the inland lake is 11.00 feet below the sea level, while the Christiania fjord is but 370 feet deep opposite Drobak. If the till were a ground moraine formed without the aid of flotation, the deep pocket of the Mjosen lake must have been filled by it, instead of being eroded deeper as it appears to have been.

Having just met with some interesting matter in Professor Sars' report on the results of the Norwegian North Sea Expedition of 1856, I must insert another last word bearing upon the above, although it is already in type. The soundings of the Sognefjord revealed a maximum depth of 3900 feet; and the other fjords running far inland are similarly scooped into deep pools, while the sea bottom near their mouths is shallowed by a series of banks, which extend more or less uniformly all around the Norwegian coast. The ordinary depth of these banks is from about fifty to one or two hundred feet. Beyond this fringe of banks the sea rapidly deepens, and reaches 12,000 feet halfway between Norway and Iceland, and about 6000 feet between Norway and the Faroe Islands.

The existence of such banks just where, according to my explanation of the constitution and termination of the ancient glaciers, there should be a great deposit of till, supplies a suggestive confirmation of this theory. If it shall hereafter be found that these banks are composed of till, the confirmation will be positive and complete.

Outside these sea banks is another fringe extending from 70 to 140 English miles from the shore. This is a rocky sea bottom, at a depth of 600 to 1800 feet, strewn with boulders "whose smooth rounded forms and worn edges clearly enough show that they had at one time been subjected to the powerful action of ice."

This, again, is exactly what we ought to find if I am right; for this fringe would be the region of floating icebergs detached from the outer ice-wall, and these icebergs would carry only such boulders; as the *bottom thawing*, for which I contend, would have washed out the lower accumulation of slimy *débris*, before the glacier had reached its ultimate out-thinning and final iceberg dispersion.

In mercy to my readers I will say no more about glaciers, but simply tell them that after a few hours' exploration of Gottenburg, we embarked on the 'Mary' for London; and really will conclude this time, only halting to

express a hope that they may close this book with feelings somewhat akin to those with which I bade farewell to Norway.

APPENDIX I.

TRAVELLING EXPENSES IN NORWAY.

In 'Through Norway with a Knapsack' I have given the full details of all my expenses. This was necessary there, as the sum total would otherwise have been quite unintelligible. I need scarcely state that, in the course of the journey described in this volume, we had no such items as supper, bed, and breakfast, for twopence farthing; and it may be that, even had I travelled alone and on foot, this curious experience would not have been repeated.

The very great development of tourist traffic throughout Norway during the last twenty years has, of course, effected considerable innovations upon the old primitive simplicity of tourists' accommodation.

On all the leading highways the stations have lost more or less of their old farmhouse character. The traveller does not now share the supper of the bonder and his housemen in the heavy timbered smoke-stained kitchen, but is provided with special apartments built on purpose for his accommodation, and fitted up as luxuriously as the ideas and means of their peasant proprietors admit.

The tourist who would now repeat my experiences of 1856 must step quite aside from the beaten tracks. By doing so, he may still find the primitive Norwegian habits unaltered, and enjoy magnificent scenery that is even now almost unexplored. This is especially the case in the wild and fjord-broken inland strip of Arctic Norway, extending from the Namsen and Vefsen valleys to the Yrarangerfjord. There is plenty of new ground there, in the exploration of which the hardest climbers of the Alpine Club may worthily distinguish themselves.

The development of tourist traffic in Norway has, of course, been accompanied with an increase of the station charges, but I found this increase considerably less than I expected. It is only in fair proportion to the additional accommodation afforded.

At Sontum's hotel, Bergen, we paid 14 dollars; i. e. at the rate of 2 dollars each for one day and a half.

At the Hotel d'Angleterre, Trondhjem, we paid 21[^] dollars; a little above 3 dollars each for two days' board and one night's lodging on our northward journey. On our return we stayed there three nights, had board for two whole days, and breakfast on the morning of starting. This, with fee to waiter and portage of luggage, cost not quite dollars each.

At the Victoria Hotel, Christiania, which is a luxurious establishment,—would rank as a first-class hotel anywhere, —we paid 38 dollars, exclusive of portage of luggage. This was for two nights, one full day's board, and breakfast on the morning of starting.

At the Hotel du Nord, Tromsø, we paid but 6 marks per day each, and, as already stated, were generously supplied with the best representatives of luxury the capital of the Arctic world could supply.

These are the town hotels, and the most expensive. I've had the best of everything, but were very moderate with wine, the combined efforts of all the ladies being unequal to the finishing of one bottle of thin claret at dinner, unless I came to the rescue after finishing my own especial bottle of resinous ale. At Bergen we had neither wine nor ale.

Thus it will be seen that our hotel expenses in the cities —excluding wine — amounted to about 2 dollars, or nine shillings each per day. Assuming that we were supplied on wholesale terms, in consideration of the magnitude of our party, I may say that an average of half-a-guinea per day will cover ordinary expenses at such hotels, the most expensive in Norway. The charges for wine are about the same as those of the steam-packet wine carte, which I have copied in full detail, page 43,

Next to these, I may take the country stations which have developed into hotels; i.e. where the proprietor, although, perhaps, still a farmer, has invested a considerable amount of capital in hotel appliances, employs regular servants to attend upon guests, and regards the whole as a regular matter of business, whereby he shall obtain a fair return for interest and risk of capital, and labour of superintendence. There are many of these on the fjords at the mouths of the greater branching valleys; such as Aak hotel, Faleidet, Itonnei, Lierdalsoren, &c., &c. Our expenses at Aak, Faleidet, and Sande, which I may quote as the examples of those at which we halted, are stated in the course of the diary, but I may here add generally, that the ordinary charge at these houses for visitors “en pension,” i.e. who stay for several days, is 6 marks per day—rather less than six shillings—exclusive of the wine and the very small gratuity commonly given to the “pigge.”

Flying visitors pay a little more, at the rate of about 14 dollar, 6s. 9d. per day.

5Ir. Bennett estimates the average expenses for board and lodging at country stations (exclusive of wine and beer) at one dollar per day. This is, I think, about correct. Our average was a little in excess of this, but it must be noted, that I carefully arranged our route so as to halt at the best and largest stations. At these the charges are justly somewhat higher than at ordinary and inferior stations.

After perusing the above, I think my readers will agree with me in concluding that the Norwegians are not yet corrupted by the redundancy of tourists—have not learned to make any extortionate demands upon the purses of their visitors, especially when the shortness of the Norwegian tourist season is considered, and also the fact, that tourists come upon the country people just in the midst of their harvest, when their time is the most valuable.

The tariff on board the steam-packets is stated in detail, page 41.

The expenses of posting, including the hire of horses, carriages, tilsegelse, and drikkepenge, amounts to about four-pence per English mile with single carriages, or threepence per mile for each traveller with double carriages. The rates have remained unaltered since my first visit, in spite of the increased value of horses and fodder, and the higher rate of wages throughout the country. As horses are much in demand for agricultural work during the tourist season, I have no reason to doubt the statement made by some of the station-masters, that the present rates of posting barely cover their expenses. The men who took us from Lierdalsoren made some profit by using very good horses, and doing several ordinary stages in the course of the day. As I have already stated, there is room for improvement in this direction. Longer stages, at corresponding rates, would pay better, and be more convenient for the tourist. With the present greatly improved roads, such increase in average length of stages is quite practicable, without over-working good horses. The existing short stages were, doubtless, adapted to the old steep inferior roads.

An important element of Norwegian travelling expenses is now materially reduced, viz. that on the fjords and lakes. This reduction is effected by the steam-packet navigation replacing the old rowing stages. The steam-packet fares vary from 1s. 6d. to 1s. 0d. per English mile for 1st class, and from rather less than three farthings per mile, to not quite one penny per mile for 2nd class; the difference depending on the distance—the rate per mile diminishing: as the distance increases. This is about one-third of the cost of boating, and, of course, the saving of time diminishes the other expenses of covering a given distance.

Fares by coasting steamers are: 1st class, 12 skillings per Norsk mile; 2nd class, 8 skillings; 3rd class, 4 skillings. A Norsk mile is rather more than 7 English miles; a skilling, not quite one halfpenny.

Married people are especially favoured, being counted as one and a half on the coasting packets, and considerable reductions are made on bona fide family tickets, but a party like ours was not accepted as a family.

The rates of passage from England to Sweden and Norway are as follows, by the Wilson line of steamers:

Hull to i Gothenburg. £ s. d. Single, 1st class .. 3 3 0 \ Victuallin Return, ,, ,, .. 5 0 Single, 2nd ,, .. 2 2 0 \ Return, ,, ,, .. 3 3 0/

4:8. Gd.

Return Tickets, if available by any of the Company's routes (Drontheim excepted), Gl. and 41.

Deck Fare, 30«., victualling included. Hull to Christiansand and £ s. d.

Christiania.

Single, 1st class Return, „ „,

Single, 2nd „, Return, „ „,

4 0 0 Victualling to Christiansand, 1st class, 15 s.

6 0 0 „, Christiania, 1st class, 11.

2 13 4 „, Christiansand, 2nd class, 10s.

4 0 0 „, Christiania, 2nd class, 12s. 6d.

Deck Fare, 30s., victualling included.

Single, 1st class Return, „ „,

Single, 2nd „, Return, „ „,

Hull to Stavanger and Bergen.

£ s. d.

.. 4 0 0 Victualling to Stavanger, 1st class, 15s.

-.6 0 0 „, Bergen, 1st class, U.

.. 2 13 4 „, Stavanger, 2nd class, 10s.

..4 0 0 „, Bergen, 2nd class, 12s. 6d.

Deck Fare, 30s., victualling included.

Hull to Drontheim.

£ \$. d.

Single, 1st class 7 7 0 1

Return, „ „, 11 11 0 I These rates include

Single, 2nd „, 4 4 0 1 a liberal table.

Return, „ „, 6 6 0)

Tickets are issued to Drontheim, to return by Bergen, Christiansand, Christiania, and Gothenburg, and vice versa, First class, 91.; Second class, 51. These rates include victualling to or from Drontheim only.

Deck Fare, 32«. 6d , victualling included.

London to Christiansand and Christiania.

£ s. d.

First class.....4 4 0

Second class2 13 4

Return Tickets also available from any of the above ports to Hull (Drontheim

excepted):

First class.....660

Second class44 0

Victualling extra per Passage—Christiansand :

First class.....1 0 0

Second class0 15 0

Victualling extra per Passage—Christiania :

First class..... 15 0

Second class017 6

APPENDIX II.

THE EXISTING AND PROJECTED NORWEGIAN RAILWAYS.

It sometimes happens that the pioneers of great enterprises suffer a sort of preliminary martyrdom due to the mistakes they inevitably make from want of special experience, and those who follow them obtain gratuitously the fruits of that experience which has been so costly to their predecessors.

This is to some extent the case with our British railways. If we were beginning all afresh now, we should lay down a very different system from that which exists, and adopt many other improvements which are now rendered more or less impracticable, without the destruction of a vast amount of existing permanent way and rolling stock.

In Norway the case is different. They began railways—or rather, a few English contractors began them, as a little investment for themselves, and, with the aid of experience, obtained here at the expense of British shareholders, were able to construct and work the first short line, from Christiania to Eidsvold, very economically and profitably. Since that time other short lines, such as those between Christiania, Dammen and Kongsberg, Christiania and Moss, Trondhjem and Storen, &c., have been constructed; but the Norwegians have wisely concluded, that however desirable may be private enterprise, when directed to ordinary work of moderate magnitude, and regulated by free competition, there are other works of national magnitude, which must become monopolies, and therefore demand national control and government regulation. They include railways among these, and, accordingly, have organized a regular system of railway communication to be carried on in accordance with the report of a Royal Commission issued in the autumn of 1875.

As the particulars of this comprehensive scheme have not yet been published in England, and they are of considerable interest to intending tourists, I have had all the existing and proposed lines laid down upon Mr. Stanford's excellent map appended to this book.

The continuous broad black lines represent the railways already completed or in course of construction, and the dotted lines are the authorized railways not commenced when the Report of the Royal Commission was issued.

I will now take the most important of these seriatim.

The line connecting Christiania with Trondhjem takes a different course from that of the existing post-road, in order to avoid the ascent of the Dovrefjeld, no small matter, seeing that the post-road rises to about 4500 feet above the Christiania fjord, and, of course, descends as much to Trondhjem. The railway will follow the valley of the Glommen, by turning off eastward from the Mjosen lake at Hamar, instead of following the Guldbrandsdal from the head of the lake at Lillehammer. It will return to the post route at Stören, and go on to Trondhjem by that beautiful portion of the line over which we travelled. This is to be completed throughout in 1878, but it is quite possible that steam communication between the ancient and modern capitals of Norway may be effected during the present year thus: rail from Christiania to Eidsvold; steam-packet on Mjosen lake to Hamar, and from thence rail to Trondhjem. The link of rail between Eidsvold and the Hamar line is to be completed in 1878. This will save three or four days, and materially assist those tourists who are hastening to catch the midnight sun.

One of the authorized lines is a further extension towards the midnight sun, viz. the line from Trondhjem to Namsos, but, as the project now stands, this is not to be completed until 1884.

The whole of that system of short lines radiating from Christiania, and shown on the map by the continuous lines, is already nearly finished, and is to be completed in 1878. The Loop line from Drammen skirting the Christiania fjord to Laurvig, then turning to Skien, and returning by the Lougen or Lauveu valley to Drammen and Christiania, is to be completed in 1881.

The southward continuation of this line, which skirts the coast from Skien to Christiansand, is to be completed in 1885 ; and its extension to Egersund, where it will meet the line from Stavanger, in 1888. This railway connection between Christiansand and Christiania will be advantageous to tourists, as the packets from England stop at Christiansand, and are usually delayed there. By taking the rail about 10 hours will be saved between Hull and Christiania. The short line running 31 Norsk miles northward (about 24 English) from Christiansand through the Torrisdal or Tonsdal to the Kilefjord, and thus communicating with the chain of lakes extending farther north, will not be commenced until 1884, and finished in 1888.

The Bergen system of lines includes, first, a line from Bergen to Yossevangen. This, after a short southward course from Bergen, bends northward, following the banks of the Sorfjord (this must not be confounded with the Sörfjord³⁶²

branch of the Hardanger), then turns eastward, following the Bolstadfjord and Evangerfjord, and the intervening valley to Yossevangen. This line, nearly 70 English miles long, will be wonderfully picturesque, and, doubtless, most popular with tourists as a high road towards the Naerodal and the Yoring Foss. It is just commenced, and is to be completed in 1880. Ultimately, the railway will be continued through the Naerodal to Gudvangen and Styve (near Umland), on the Sognefjord. This branch (about 28 English miles), which for scenery will doubtless be the most wonderful bit of railway in the world, is to be commenced in 1881, and finished in 1888.

Another branch (about 18 English miles), from Yossevangen, will proceed to the Gravenfjord, a short branch of the northern extremity of the Hardangerfjord, and within a short run of the Yoring Foss and Skiggedal. This is to be commenced in 1881, and completed in 1885.

The longest, and commercially the most important extension of the line, from Yossevangen, is that which will connect Bergen and Christiania, by crossing the country via the Bundal, Hallingskarven, the Ustedal, Strandefjord, Aal, the Hallingsdal, Gol, Naes, Flaa, the Kroderenfjord, to Sigdal, where it will join the present line to Drammen, and thence to Christiania. The length of this piece, from Yossevangen to the existing line, is 221 Norsk miles, about 160 English. It is to be commenced in 1880, and finished in 1885. The whole distance between Bergen and Christiania will be about 300 English miles, with magnificent scenery throughout.

Another great line is that which will connect Christiania with Aalesund; the whole line 53i Norsk miles—about 376 English miles. The first portion of this, between Christiania and Lille-hammer, to commence this year, and be finished in 1882.

The second portion, from Lillehammer, through the Guldbrandsdal and the Romsdal to Veblungsnaes, which, I believe, is already commenced, is to be completed in

1883. This will be a very interesting and useful line for tourists.

The final extension, from the mouth of the Romsdal to Aalesund, bridging over a considerable amount of sea, and not very important to tourists, inasmuch as steam-packet communication already exists, is to be commenced in

1884, and finished in 1887. I am not able to understand why this is projected at all, unless it be in consideration of the commercial interests of Aalesund, which would be left out in the cold, by making Veblungsnaes the seaport terminus of this line. As the project stands, the interval between the completion of the line to Veblungsnaes, in 1883, and that of the link with Aalesund in 1887, will be sufficient to build up a great

advantage in favour of the port of the Romsdal.

The short link between Hamar and Lillehammer, on the east side of the Mjosen lake, is to be commenced in 1882, and finished in 1885.

The line which is to connect Christiania with the foot of the Fillefjeld will proceed by the existing line via Drammen to Idnefoss, where the new line will commence and follow the Spirdilen lake, instead of the Enndsfjord by which we came; then through the Baegna valley up to the Vangsmjosen. This line will probably be commenced in 1884, and finished in 1889. Its length, from Idnefoss to Vangsmjosen, 15½ Norsk miles.

Among the lines which, like the last named, are to be looked for in the rather distant future, is one following my

APPENDIX II.

walk in 1856, and connecting Trondhjem with the fjords leading on to Christiansund. This line is to branch from the Melhuus station on the existing railway, and proceed through the Orkedal and Surendal to Surendalsoren. To be commenced in 1884, and finished in 1888.

The branch following the valley of the Glominen, between Elverum and Kongsvinger, which will form a loop between the existing Christiania and Trondhjem main line and the line proceeding into Sweden, is to be commenced in 1879, and completed in 1883.

Another similar line farther south, between Blakjer and Trogstad, looping the Christiania and Kongsvinger line with those of the Smaalens district, is to be commenced in 1884, and finished in 1887.

As will be seen on the map there are three short lines north of the Arctic circle, all of which proceed eastwards, to the Swedish frontier. In conjunction with the Swedish railways and river and lake navigation, these will communicate with the Gulf of Bothnia. Another similar line to Sweden branches from Trondhjem via the Stordal and Merak. The importance of these is chiefly commercial, though to tourists desirous of exploring the curious lake-dotted region between Norway and the Gulf of Bothnia, they will afford important facilities.

The total length of the projected railways remaining unfinished at the date of the report was, 254.68 Norwegian miles, equal to about 2000 English miles, and the total work demanded for the completion of this has been divided into 159,500 units. The above-quoted dates of construction are based on the assumption that, from the present year to end of 1885, 12,400 units of work will be done annually, and then the amount will decline to 10,700 in 1886, 9500 in 1887, 5950 in 1888, and be completed by 2700 in 1889. Other estimates of the rate of progress have been made, but I have quoted this as the one put forward most prominently in the report, and the most likely to be fulfilled.

My own opinion is, that this estimated rate of progress will be exceeded, as I believe that the lines first to be completed will be found to work so profitably that they will encourage an accelerated rate of working upon those remaining unfinished. Railway communication between Christiania and Stockholm is already completed.

The Norwegian government has no difficulty in raising the loans required for the construction of these lines. They are readily obtained at 44 per cent. Norway is exceptionally solvent, a natural consequence of keeping the peace with her neighbours, and having a very small army. The national debt, at the end of last year, amounted to 2,625,001?., against which the government has railway property that cost 2,500,000?., and shares in the Bank of Norway, and other interest-bearing securities, representing at present market prices about 1 305,000?.. more. Thus, the interest yielding property of the government exceeds the national debt by nearly a million ; and every year the revenue yields a surplus.

The above does not include the recent railway loan of 1,320,000?.. at 44 per cent. The subscription price of this stock was 96?.. 10s. per 100?.. It is to be redeemed in 39 years by means of an accumulating sinking fund. The government will then have the unburdened possession of the railways constructed with this capital, and their full profits will be available for the reduction of taxation.

Had ordinary prudence and foresight been exercised by our government; or, in other words, if the managers of

the national property had managed it as they manage their own, they would have granted the railway companies who came to Parliament begging and competing for powers to construct, not the fee-simple of the lines, but a lease for 99 years—such as they give their own house-building tenants. This would have been accepted, and at the end of the term the whole of our national debt would have been balanced by the railway property of the government.

APPENDIX III.

NORWEGIAN STEAM-PACKET ARRANGEMENTS FOR 1877.

For the benefit of tourists visiting Norway this season, I append the following information respecting the Norwegian steam-packets for the summer of 1877, as officially announced in the 'Norges Kommunikationer,' up to April 5th, 1877:

1st. Between London and Christiania, *viâ* Christiansand, the 'Albion,' every alternate Thursday evening. Christiansand, 46 hours; Christiania, 60 hours.

2nd. Between Hull and Christiania, *viâ* Christiansand, the 'Angelo' and 'Hero,' every Friday evening. (The 'Angelo' is the best boat on the service.) Christiansand, 40 hours; Christiania, 56 hours.

3rd. Between Hull and Bergen, the 'Domino' (stopping at Stavanger), every alternate Thursday, commencing 12th April. Stavanger, 48 hours; Bergen, 60 hours.

4th. Between Hull and Trondhjem, the 'Tasso' every alternate Thursday, commencing 5th April. 75 hours.* All of these are "Wilson liners," and full particulars concerning them may be obtained by application to Messrs. Wilson and Co., shippers, Hull.

5th. Occasional steamers run between Leith and Christiania, between Newcastle-on-Tyne and Christiania and Bergen, &c., and there are regular packets between London and Gottenburg, and between Hull and Gottenburg, from whence Christiania may easily be reached by rail or steam-packet. As the particulars concerning these are given in Bradshaw, I will not occupy more space with them, but proceed to the purely Norwegian traffic.

The vessels steaming round the Norwegian coast are the following:

1st. The Bergen and Nordenijelde Steam-packet Company's packets, making the long route from Hamburg round the North Cape to Vadsö. These run weekly from 17th March to the end of the season, starting every Saturday from Hamburg, reaching Christiansand on Monday, then proceeding westwards (not to Christiania), stopping at many intermediate stations, and reaching Stavanger on Tuesday; then to intermediate stations and Bergen, from which, after a day's halt, they start again on Friday, and by Aalesund, &c., reach Molde on Saturday; then by Christiansand, Ac., to Trondhjem, where a long halt is made, and the journey resumed on Wednesday; then after calling at twenty-five minor stations, a halt is made at Bodö. Start from Bodö on Friday, and call at fourteen stations before reaching Tromsö on Saturday night. Halt again and start on Sunday night, calling at six intermediate stations, and reach Hammerfest in time to halt there for some hours, and go on again on Monday. Then * The above are advertised estimates of "average passage." round the North Cape to Vardö and Vadsö, which with twenty intermediate stations occupies two days more. A halt of one day is made at Vadsö, and then the packet returns on Thursday; leaves Hammerfest on Sunday, Tromsö on Monday (midday), Bodö on Wednesday, Trondhjem on Saturday, Aalesund on Sunday, Bergen on Wednesday, Christiansand on Friday, and reaches Hamburg on Saturday—about live weeks altogether. During last winter they only went as far as Hammerfest.

These vessels do not cross to the Lofodens, but communicate with the service of inter-Lofoden packets (see pp. 79 and 80), which they meet at Bodö on Fridays. These small packets, after completing their round of the

Lofoden stations, return to Bodö on the following Thursday; but tourists who wish to go on farther northwards may generally meet one of the northward packets before returning to Bodö.

2nd. Another line of packets belonging to the same Company, run from Christiania round the coast to Tromsö and then return, calling at many intermediate stations. These leave Christiania every Thursday at midday ; Christiansand on Friday, Stavanger on Saturday, Bergen on Sunday, 11 p.m. ; Christiansund, Thursday; Trondhjem on Friday, Sömnæs on Saturday, Selsövig on Sunday; reaching Tromsö on Monday night or Tuesday morning, and returning on Thursday. These have not crossed to the Lofodens this year as they have done hitherto, but correspond with the local Lofoden packets at Lödingen, where passengers must change for these which leave Lödingen at 7 a.m. on Tuesdays and return to Lödingen on Wednesdays at 8 p.m. to meet the returning Christiania packet. The route of these packets is otherwise considerably altered. They now stop at twenty-three stations between Trondhjem and Bodö instead of only fourteen as last summer. These additional stations are in the Salten and other fjords. They may possibly resume the old route—that by which we sailed from Trondhjem during the summer months of this year.

In addition to these there are two newly added packets on this route, the 'John Schöning' and the 'Jonas Lie,' which go from Christiania to Vardö. They also cross to the Lofodens, and call at some of the Lofoden stations. They are not so regular as the others. Last summer they only ran between Christiania and Hammerfest from June to end of the year, but have now resumed the route to Vardö.

These do not appear to belong to the Bergen and Nordfjeld Company, and I am not aware whether the return tickets of that Company are available by them. Return tickets issued by either of this Company's boats are available on all others on the same route.

Generally speaking, when not otherwise stated, the starting time is midnight, but the meaning of this requires explanation. What we call the midnight of Wednesday, the Norwegians call morning of Thursday. Therefore, when a boat is to start on Thursday, read 12 midnight on Wednesday, and same for other days. Inattention to this may cause serious disappointment.

Besides these, the 'Michael Krohn' and 'President Christie' sail at intervals between Bergen and Vardö, by nearly the same course, and calling at sixty-six intermediate stations, and affording a fair opportunity of seeing the Lofodens. Only the sailings to end of May are at present announced, but further information is obtainable from G. A. Gundersen, Krohnexpeditören, Bergen.

Between Christiania and Trondhjem there is another

2 B

weekly service by the three packets, c Bravo,' ' Bjorgvin,' and ' Fiskeren.' One or the other of these usually leaves Christiania weekly on Sunday morning, and returns from Trondhjem on Tuesday afternoon, but at present the ' Bjorgvin ' is under repair.

The ' Vidar ' sails about once a month from Christiania for Tromsö, occupying about fourteen days each way, or six days between Trondhjem and Tromsö, and same returning. Another occasional packet is the 'Anna and Caroline' between Christiania and Vardo. It does not appear to sail at fixed intervals, as only single journeys are announced. It was to sail from Vardo on 28th March, and arrive at Christiania 11th April.

The above information, coupled with the programme on page 89, will doubtless be very valuable to English tourists, who wish to catch the midnight sun, and cannot leave England early in the season. They must allow three clear days between Hull and Christiania, or two days between Hull and Christiansand ; about four days for land journey from Christiania to Trondhjem. Two and a half days Hull to Stavanger, or three days Hull to Bergen. The ' Tasso,' direct from Hull to Trondhjem, starts on alternate Thursdays, as above stated. About four days should be allowed for this trip.

Besides these the ' Motala ' and 'Hyland' sail alternately between Christiania and Bergen, one or other leaving

Christiania every Friday at 10.30 p.m., Christiansand every Sunday at 5 a.m., reaching Bergen on the day following, and returning from Bergen every Thursday at 11 a.m., from Christiansand on Saturday at 3 a.m., reaching Christiania on Saturday evening.

English passengers travelling by the London and Christiania packets may meet these at Christiansand, and proceed by them to Bergen. With a good passage the Hull packets meet them.

There is another service between Christiania and Bergen, the 'Kong S verre' and 'Stavanger,' which leave Christiania every Monday at 10.30 p.m., Christiansand every Wednesday at 5 a.m., and reach Bergen at about midday on Thursday. They return from Bergen on Mondays at 11 xY.m., Christiansand at 3 a.m. on Wednesday, and reach Christiania at about midnight on Wednesday.

Both of these services include about twenty intermediate stations.

Between Hamburg and Christiania the 'Sanct Olav' and 'Kong Magnus' run weekly, from Hamburg every Saturday, and from Christiania every Saturday at 3 p.m., arriving at their respective destinations on Tuesday night or Wednesday morning.

There is a fortnightly packet between Christiania and Havre, starting from Christiania, every alternate Thursday during the season.

All these coasting packets are usually punctual in starting from the principal stations where they make a liait, but not so to their time of arrival.

The packets in the Christiania fjord are too numerous to specify in detail. They run daily to the various stations between Christiania and Frederiksvaern, some of them going round to Christiansand, others proceeding on to Gottenburg and Copenhagen, &c. The 'Uffo' sails from Christiania every Thursday at 1 p.m. for Copenhagen via Fredrikshavn, reaching Copenhagen on Saturdays at 7 a.m., and returning from Copenhagen on Sunday at 4 P.M., due at Christiania on Tuesday 1 p.m.

The 'Aarhus' leaves Christiania for Copenhagen via Gottenburg every Sunday at 7 a.m., reaching Gottenburg Monday morning, and Copenhagen on Monday evening. Returns from Copenhagen by same route every Wednesday 5 p.m., due at Christiania Friday 1 p.m.

These, and the multitude of small packets now running on the Hardangerfjord, the Sognefjord, Nordfjord, and all the other important fjords and lakes of Norway, will chiefly concern the tourist *after he has reached Norway*, where he will best obtain on the spot the information he requires. Or he may study these details on his way across in the 'Norges Kommunikationer,' a copy of which he will usually find on board of Messrs. Wilson's packets, or which he may obtain from Messrs. Wilson at Hull, or from Mr. Bennett of Christiania. This is a Norwegian paper, but nevertheless he will be able to read it by the aid of a Danish dictionary, or better still by using Mr. Bennett's special vocabulary, designed as a key to this 'Kommunikationer.'

As I am writing this, on 11th April, with information up to last post from Christiania, at which date the summer announcements of *some* of the services are not yet published, there may be a few small changes on some of the above details.

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Author's route

A MAP OF

NORWAY

Shewing

the Author's route

and the

Projected Railway System

THROUGH

NORWAY

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